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IPNF Stands
IPNF Roads
IPNF Fires
STATSGO
HUCadmin.shp
county.shp
citybnd.shp
nwstates.shp
owner.shp
state.shp
gage.shp
wqlstr.shp
panstrm.shp
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npdes.shp
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Glossary

303(d)	Refers to section 303 subsection "d" of the Clean Water Act. 303(d) requires states to develop a list of water bodies that do not meet water quality standards. This section also requires total maximum daily loads (TMDLs) be prepared for listed waters. Both the list and the TMDLs are subject to U.S. Environmental Protection Agency approval.
Ambient	General conditions in the environment. In the context of water quality, ambient waters are those representative of general conditions, not associated with episodic perturbations, or specific disturbances such as a wastewater outfall (Armantrout 1998, EPA 1996).
Bedload	Material (generally sand-sized or larger sediment) that is carried along the streambed by rolling or bouncing.
Beneficial Use	Any of the various uses of water, including, but not limited to, aquatic life, recreation, water supply, wildlife habitat, and aesthetics, which are recognized in water quality standards.
Beneficial Use Reconnaissance Program (BURP)	A program for conducting systematic biological and physical habitat surveys of water bodies in Idaho. Beneficial Use Reconnaissance Program protocols address lakes, reservoirs, and wadeable streams and rivers.
Best Management Practices (BMPs)	Structural, nonstructural, and managerial techniques that are effective and practical means to control nonpoint source pollutants.
Biota	The animal and plant life of a given region.
Clean Water Act (CWA)	The Federal Water Pollution Control Act (Public Law 92-500, commonly known as the Clean Water Act), as last reauthorized by the Water Quality Act of 1987 (Public Law 100-4), establishes a process for states to use to develop information on, and control the quality of, the nation's water resources.
Coliform Bacteria	A group of bacteria predominantly inhabiting the intestines of humans and animals but also found in soil. Coliform bacteria are commonly used as indicators of the possible presence of pathogenic organisms (also see Fecal Coliform Bacteria).

Community A group of interacting organisms living together in a given place.

Conductivity The ability of an aqueous solution to carry electric current, expressed in micro (µ) mhos/cm at 25 °C. Conductivity is affected by dissolved solids and is used as an indirect measure of total dissolved solids in a water sample.

Criteria In the context of water quality, numeric or descriptive factors taken into account in setting standards for various pollutants. These factors are used to determine limits on allowable concentration levels, and to limit the number of violations per year. EPA develops criteria guidance; states establish criteria.

Cubic Feet per Second A unit of measure for the rate of flow or discharge of water. One cubic foot per second is the rate of flow of a stream with a cross-section of one square foot flowing at a mean velocity of one foot per second. At a steady rate, once cubic foot per second is equal to 448.8 gallons per minute and 10,984 acre-feet per day.

Designated Uses Those water uses identified in state water quality standards that must be achieved and maintained as required under the Clean Water Act.

Discharge The amount of water flowing in the stream channel at the time of measurement. Usually expressed as cubic feet per second (cfs).

Dissolved Oxygen (DO) The oxygen dissolved in water. Adequate DO is vital to fish and other aquatic life.

Disturbance Any event or series of events that disrupts ecosystem, community, or population structure and alters the physical environment.

E. coli Short for *Escherichia Coli*, *E. coli* are a group of bacteria that are a subspecies of coliform bacteria. Most *E. coli* are essential to the healthy life of all warm-blooded animals, including humans. Their presence is often indicative of fecal contamination.

Endangered Species Animals, birds, fish, plants, or other living organisms threatened with imminent extinction. Requirements for declaring a species as endangered are contained in the Endangered Species Act.

Environment	The complete range of external conditions, physical and biological, that affect a particular organism or community.
Erosion	The wearing away of areas of the earth's surface by water, wind, ice, and other forces.
Exceedence	A violation (according to DEQ policy) of the pollutant levels permitted by water quality criteria.
Existing Beneficial Use	A beneficial use actually attained in waters on or after November 28, 1975, whether or not the use is designated for the waters in Idaho's *Water Quality Standards and Wastewater Treatment Requirements* (IDAPA 58.01.02).
Fauna	Animal life, especially the animals characteristic of a region, period, or special environment.
Fecal Coliform Bacteria	Bacteria found in the intestinal tracts of all warm-blooded animals or mammals. Their presence in water is an indicator of pollution and possible contamination by bacteria (also see Coliform Bacteria).
Fecal Streptococci	A species of spherical bacteria including pathogenic strains found in the intestines of warm-blooded animals.
Flow	See Discharge.
Fully Supporting	In compliance with water quality standards and within the range of biological reference conditions for all designated and exiting beneficial uses as determined through the *Water Body Assessment Guidance* (Grafe et al. 2002).
Fully Supporting Cold Water	Reliable data indicate functioning, sustainable cold water biological assemblages (e.g., fish, macroinvertebrates, or algae), none of which have been modified significantly beyond the natural range of reference conditions (EPA 1997).
Geographical Information Systems (GIS)	A georeferenced database.
Geometric Mean	A back-transformed mean of the logarithmically transformed numbers often used to describe highly variable, right-skewed data (a few large values), such as bacterial data.
Gradient	The slope of the land, water, or streambed surface.

Habitat	The living place of an organism or community.
Headwater	The origin or beginning of a stream.
Hydrologic Unit	One of a nested series of numbered and named watersheds arising from a national standardization of watershed delineation. The initial 1974 effort (USGS 1987) described four levels (region, subregion, accounting unit, cataloging unit) of watersheds throughout the United States. The fourth level is uniquely identified by an eight-digit code built of two-digit fields for each level in the classification. Originally termed a cataloging unit, fourth field hydrologic units have been more commonly called subbasins. Fifth and sixth field hydrologic units have since been delineated for much of the country and are known as watershed and subwatersheds, respectively.
Hydrologic Unit Code (HUC)	The number assigned to a hydrologic unit. Often used to refer to fourth field hydrologic units.
Inorganic	Materials not derived from biological sources.
Instantaneous	A condition or measurement at a moment (instant) in time.
Load Allocation (LA)	A portion of a water body's load capacity for a given pollutant that is given to a particular nonpoint source (by class, type, or geographic area).
Load(ing)	The quantity of a substance entering a receiving stream, usually expressed in pounds or kilograms per day or tons per year. Loading is the product of flow (discharge) and concentration.
Load capacity (LC)	A determination of how much pollutant a water body can receive over a given period without causing violations of state water quality standards. Upon allocation to various sources, and a margin of safety, it becomes a total maximum daily load.
Macroinvertebrate	An invertebrate animal (without a backbone) large enough to be seen without magnification and retained by a 500 µm mesh (U.S. #30) screen.

Margin of Safety (MOS)	An implicit or explicit portion of a water body's load capacity set aside to allow the uncertainly about the relationship between the pollutant loads and the quality of the receiving water body. This is a required component of a total maximum daily load (TMDL) and is often incorporated into conservative assumptions used to develop the TMDL (generally within the calculations and/or models). The MOS is not allocated to any sources of pollution.
Mass Wasting	A general term for the down slope movement of soil and rock material under the direct influence of gravity.
Mean	Describes the central tendency of a set of numbers. The arithmetic mean (calculated by adding all items in a list, then dividing by the number of items) is the statistic most familiar to most people.
Metric	1) A discrete measure of something, such as an ecological indicator (e.g., number of distinct taxon). 2) The metric system of measurement.
Milligrams per Liter (mg/L)	A unit of measure for concentration in water, essentially equivalent to parts per million (ppm).
Miocene	Of, relating to, or being an epoch of, the Tertiary between the Pliocene and the Oligocene periods, or the corresponding system of rocks.
Monitoring	A periodic or continuous measurement of the properties or conditions of some medium of interest, such as monitoring a water body.
Mouth	The location where flowing water enters into a larger water body.
Nitrogen	An element essential to plant growth, and thus is considered a nutrient.
Nonpoint Source	A dispersed source of pollutants, generated from a geographical area when pollutants are dissolved or suspended in runoff and then delivered into waters of the state. Nonpoint sources are without a discernable point or origin. They include, but are not limited to, irrigated and non-irrigated lands used for grazing, crop production, and silviculture; rural roads; construction and mining sites; log storage or rafting; and recreation sites.

Nutrient	Any substance required by living things to grow. An element or its chemical forms essential to life, such as carbon, oxygen, nitrogen, and phosphorus. Commonly refers to those elements in short supply, such as nitrogen and phosphorus, which usually limit growth.
Organic Matter	Compounds manufactured by plants and animals that contain principally carbon.
Bacteria	Disease-producing organisms (e.g., bacteria, viruses, parasites).
pH	The negative $\log_{10}$ of the concentration of hydrogen ions, a measure which in water ranges from very acid (pH=1) to very alkaline (pH=14). A pH of 7 is neutral. Surface waters usually measure between pH 6 and 9.
Phosphorus	An element essential to plant growth, often in limited supply, and thus considered a nutrient.
Point Source	A source of pollutants characterized by having a discrete conveyance, such as a pipe, ditch, or other identifiable "point" of discharge into a receiving water. Common point sources of pollution are industrial and municipal wastewater.
Pollutant	Generally, any substance introduced into the environment that adversely affects the usefulness of a resource or the health of humans, animals, or ecosystems.
Pollution	A very broad concept that encompasses human-caused changes in the environment which alter the functioning of natural processes and produce undesirable environmental and health effects. This includes human-induced alteration of the physical, biological, chemical, and radiological integrity of water and other media.
Population	A group of interbreeding organisms occupying a particular space; the number of humans or other living creatures in a designated area.
Quality Assurance (QA)	A program organized and designed to provide accurate and precise results. Included are the selection of proper technical methods, tests, or laboratory procedures; sample collection and preservation; the selection of limits; data evaluation; quality control; and personnel qualifications and training. The goal of QA is to assure the data provided are of the quality needed and claimed (Rand 1995, EPA 1996).

Quality Control (QC) Routine application of specific actions required to provide information for the quality assurance program. Included are standardization, calibration, and replicate samples. QC is implemented at the field or bench level (Rand 1995 EPA 1996).

Quantitative Descriptive of size, magnitude, or degree.

Reach A stream section with fairly homogenous physical characteristics.

Reconnaissance An exploratory or preliminary survey of an area.

Reference A physical or chemical quantity whose value is known, and thus is used to calibrate or standardize instruments.

Reference Condition 1) A condition that fully supports applicable beneficial uses with little affect from human activity and represents the highest level of support attainable. 2) A benchmark for populations of aquatic ecosystems used to describe desired conditions in a biological assessment and acceptable or unacceptable departures from them. The reference condition can be determined through examining regional reference sites, historical conditions, quantitative models, and expert judgment (Hughes 1995).

Reference Site A specific locality on a water body that is minimally impaired and is representative of reference conditions for similar water bodies.

Resident A term that describes fish that do not migrate.

Riffle A relatively shallow, gravelly area of a streambed with a locally fast current, recognized by surface choppiness. Also an area of higher streambed gradient and roughness.

Riparian Associated with aquatic (stream, river, lake) habitats. Living or located on the bank of a water body.

River A large, natural, or human-modified stream that flows in a defined course or channel, or a series of diverging and converging channels.

Runoff The portion of rainfall, melted snow, or irrigation water that flows across the surface, through shallow underground zones (interflow), and through ground water to creates streams.

Sediments	Deposits of fragmented materials from weathered rocks and organic material that were suspended in, transported by, and eventually deposited by water or air.
Species	1) A reproductively isolated aggregate of interbreeding organisms having common attributes and usually designated by a common name. 2) An organism belonging to such a category.
Stream	A natural water course containing flowing water, at least part of the year. Together with dissolved and suspended materials, a stream normally supports communities of plants and animals within the channel and the riparian vegetation zone.
Stream Order	Hierarchical ordering of streams based on the degree of branching. A first-order stream is an unforked or unbranched adverse effects on ecosystems or human health.
Subbasin	A large watershed of several hundred thousand acres. This is the name commonly given to 4th field hydrologic units (also see Hydrologic Unit).
Subbasin Assessment (SBA)	A watershed-based problem assessment that is the first step in developing a total maximum daily load in Idaho.
Subwatershed	A smaller watershed area delineated within a larger watershed, often for purposes of describing and managing localized conditions. Also proposed for adoption as the formal name for 6th field hydrologic units.
Surface Fines	Sediments of small size deposited on the surface of a streambed or lake bottom. The upper size threshold for fine sediment for fisheries purposes varies from 0.8 to 605 mm depending on the observer and methodology used. Results are typically expressed as a percentage of observation points with fine sediment.
Surface Water	All water naturally open to the atmosphere (rivers, lakes, reservoirs, streams, impoundments, seas, estuaries, etc.) and all springs, wells, or other collectors that are directly influenced by surface water.
Threatened Species	Species, determined by the U.S. Fish and Wildlife Service, which are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

Total Maximum Daily Load (TMDL)	A TMDL is a water body's load capacity after it has been allocated among pollutant sources. It can be expressed on a time basis other than daily if appropriate. Sediment loads, for example, are often calculated on an annual bases. TMDL = Load capacity = Load Allocation + Waste Load Allocation + Margin of Safety. In common usage, a TMDL also refers to the written document that contains the statement of loads and supporting analyses, often incorporating TMDLs for several water bodies and/or pollutants within a given watershed.
Tributary	A stream feeding into a larger stream or lake.
Turbidity	A measure of the extent to which light passing through water is scattered by fine suspended materials. The effect of turbidity depends on the size of the particles (the finer the particles, the greater the effect per unit weight) and the color of the particles.
Waste Load Allocation (WLA)	The portion of receiving water's load capacity that is allocated to one of its existing or future point sources of pollution. Waste load allocations specify how much pollutant each point source may release to a water body.
Water Body	A stream, river, lake, estuary, coastline, or other water feature, or portion thereof.
Water Column	Water between the interface with the air at the surface and the interface with the sediment layer at the bottom. The idea derives from a vertical series of measurements (oxygen, temperature, phosphorus) used to characterize water.
Water Pollution	Any alteration of the physical, thermal, chemical, biological, or radioactive properties of any waters of the state, or the discharge of any pollutant into the waters of the state, which will or is likely to create a nuisance or to render such waters harmful, detrimental, or injurious to public health, safety, or welfare; to fish and wildlife; or to domestic, commercial, industrial, recreational, aesthetic, or other beneficial uses.
Water Quality	A term used to describe the biological, chemical, and physical characteristics of water with respect to its suitability for a beneficial use.

Water Quality Criteria	Levels of water quality expected to render a body of water suitable for its designated uses. Criteria are based on specific levels of pollutants that would make the water harmful if used for drinking, swimming, farming, or industrial processes.
Water Quality Limited	A label that describes water bodies for which one or more water quality criterion is not met or beneficial uses are not fully supported. Water quality limited segments may or may not be on a 303(d) list.
Water Quality Limited Segment (WQLS)	Any segment placed on a state's 303(d) list for failure to meet applicable water quality standards, and/or is not expected to meet applicable water quality standards in the period prior to the next list. These segments are also referred to as "303(d) listed."
Water Quality Standards	State-adopted and EPA-approved ambient standards for water bodies. The standards prescribe the use of the water body and establish the water quality criteria that must be met to protect designated uses.
Watershed	1) All the land which contributes runoff to a common point in a drainage network, or to a lake outlet. Watersheds are infinitely nested, and any large watershed is composed of smaller "subwatersheds." 2) The whole geographic region which contributes water to a point of interest in a water body.
Wetland	An area that is at least some of the time saturated by surface or ground water so as to support with vegetation adapted to saturated soil conditions. Examples include swamps, bogs, fens, and marshes.
Young of the Year	Young fish born the year captured; evidence of spawning activity.

Appendix A

Unit Conversions Chart

Appendix A. Unit Conversions Chart

	English Units	Metric Units	To Convert	Example
Distance	Miles (mi)	Kilometers (km)	1 mi = 1.61 km 1 km = 0.62 mi	3 mi = 4.83 km 3 km = 1.86 mi
Length	Inches (in) Feet (ft)	Centimeters (cm) Meters (m)	1 in = 2.54 cm 1 cm = 0.39 in 1 ft = 0.30 m 1 m = 3.28 ft	3 in = 7.62 cm 3 cm = 1.18 in 3 ft = 0.91 m 3 m = 9.84 ft
Area	Acres (ac) Square Feet (ft^2) Square Miles (mi^2)	Hectares (ha) Square Meters (m^2) Square Kilometers (km^2)	1 ac = 0.40 ha 1 ha = 2.47 ac 1 ft^2 = 0.09 m^2 1 m^2 = 10.76 ft^2 1 mi^2 = 2.59 km^2 1 km^2 = 0.39 mi^2	3 ac = 1.20 ha 3 ha = 7.41 ac 3 ft^2 = 0.28 m^2 3 m^2 = 32.29 ft^2 3 mi^2 = 7.77 km^2 3 km^2 = 1.16 mi^2
Volume	Gallons (g) Cubic Feet (ft^3)	Liters (L) Cubic Meters (m^3)	1 g = 3.78 l 1 l = 0.26 g 1 ft^3 = 0.03 m^3 1 m^3 = 35.32 ft^3	3 g = 11.35 l 3 l = 0.79 g 3 ft^3 = 0.09 m^3 3 m^3 = 105.94 ft^3
Flow Rate	Cubic Feet per Second (ft^3/sec)[1]	Cubic Meters per Second (m^3/sec)	1 ft^3/sec = 0.03 m^3/sec 1 m^3/sec = ft^3/sec	3 ft^3/sec = 0.09 m^3/sec 3 m^3/sec = 105.94 ft^3/sec
Concentration	Parts per Million (ppm)	Milligrams per Liter (mg/L)	1 ppm = 1 mg/L[2]	3 ppm = 3 mg/L
Weight	Pounds (lbs)	Kilograms (kg)	1 lb = 0.45 kg 1 kg = 2.20 lbs	3 lb = 1.36 kg 3 kg = 6.61 kg
Temperature	Fahrenheit (°F)	Celsius (°C)	°C = 0.55 (F - 32) °F = (C x 1.8) + 32	3 °F = -15.95 °C 3 ° C = 37.4 °F

Appendix B

Data and Data Sources

Appendix B. Data and Data Sources

Continuous temperature data collected at several stream locations in the St. Joe River subbasin (17010304).

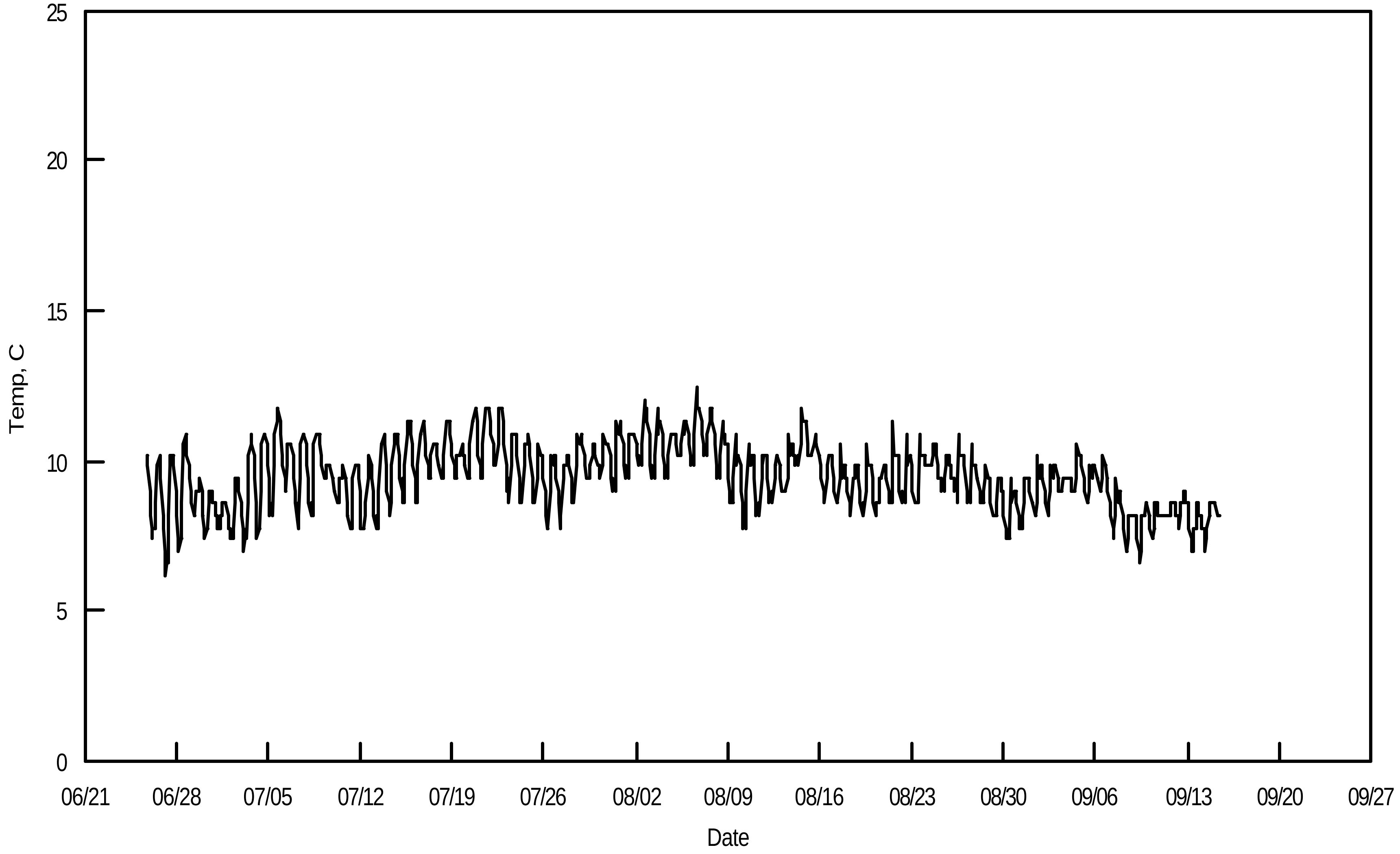

Figure B-1. Bear Creek Temperature Profile, Summer 1997

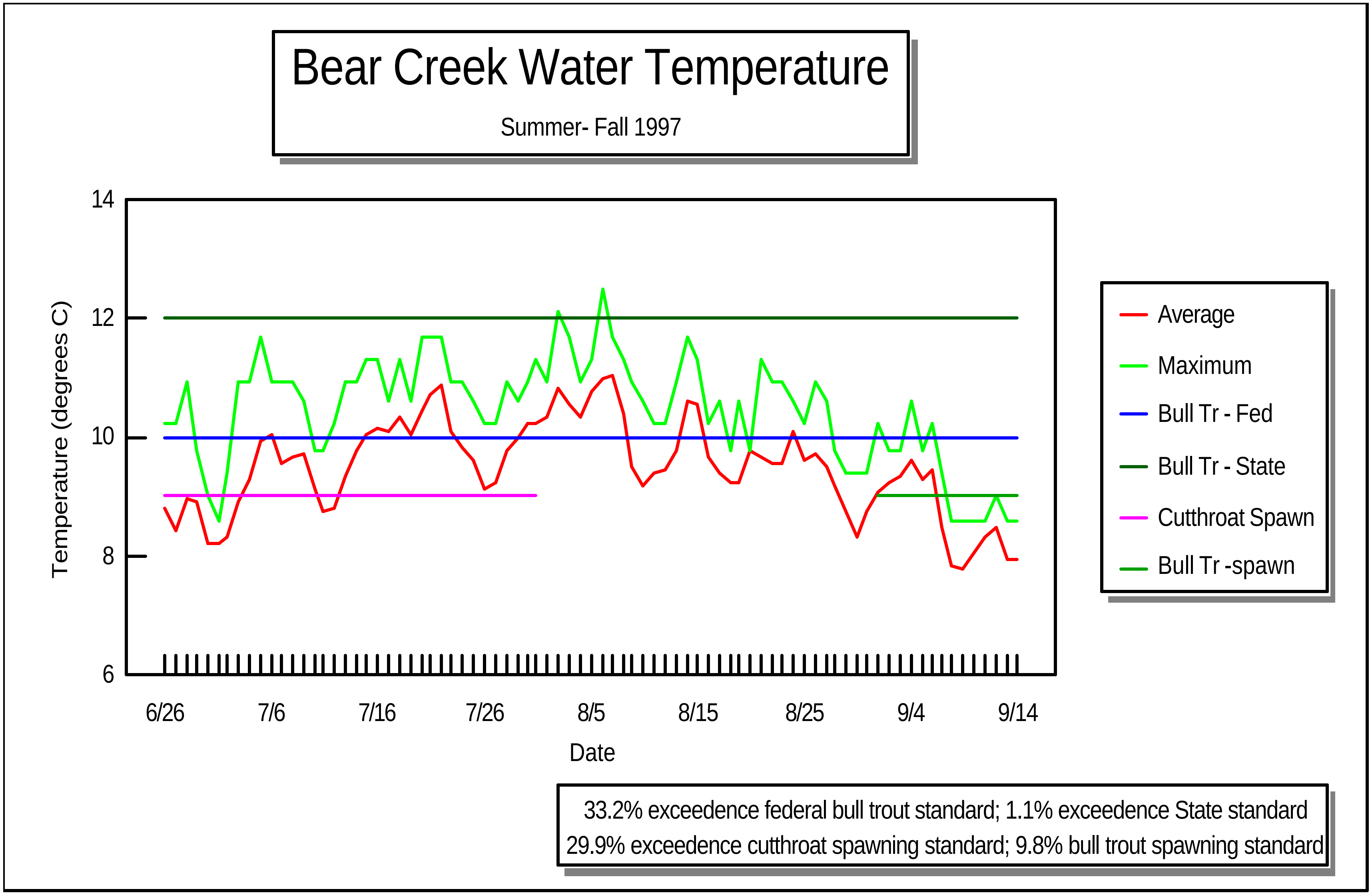

Figure B-2. Bear Creek Water Temperature Analysis

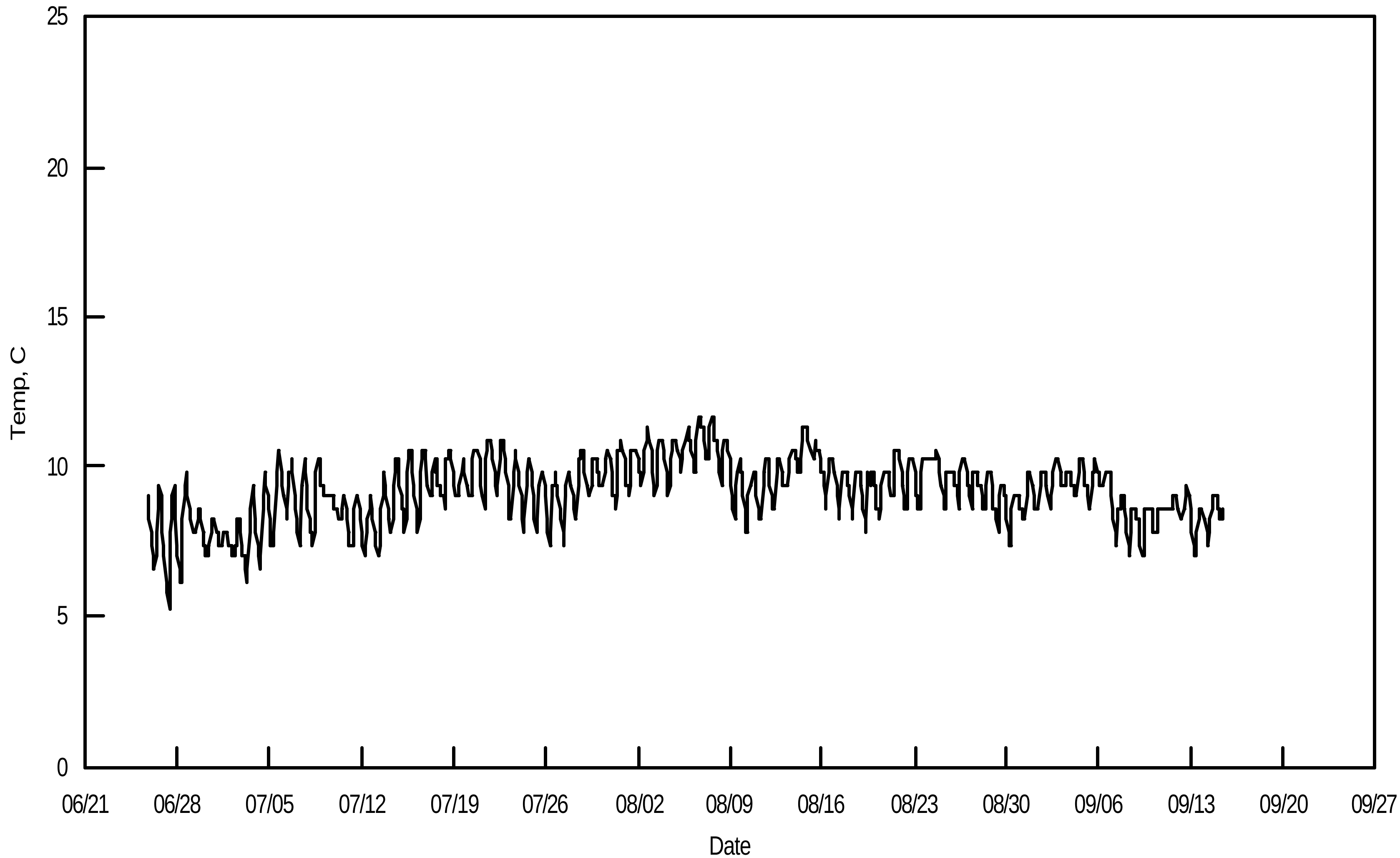

Figure B-3. Little Bear Creek Temperature Profile, Summer 1997

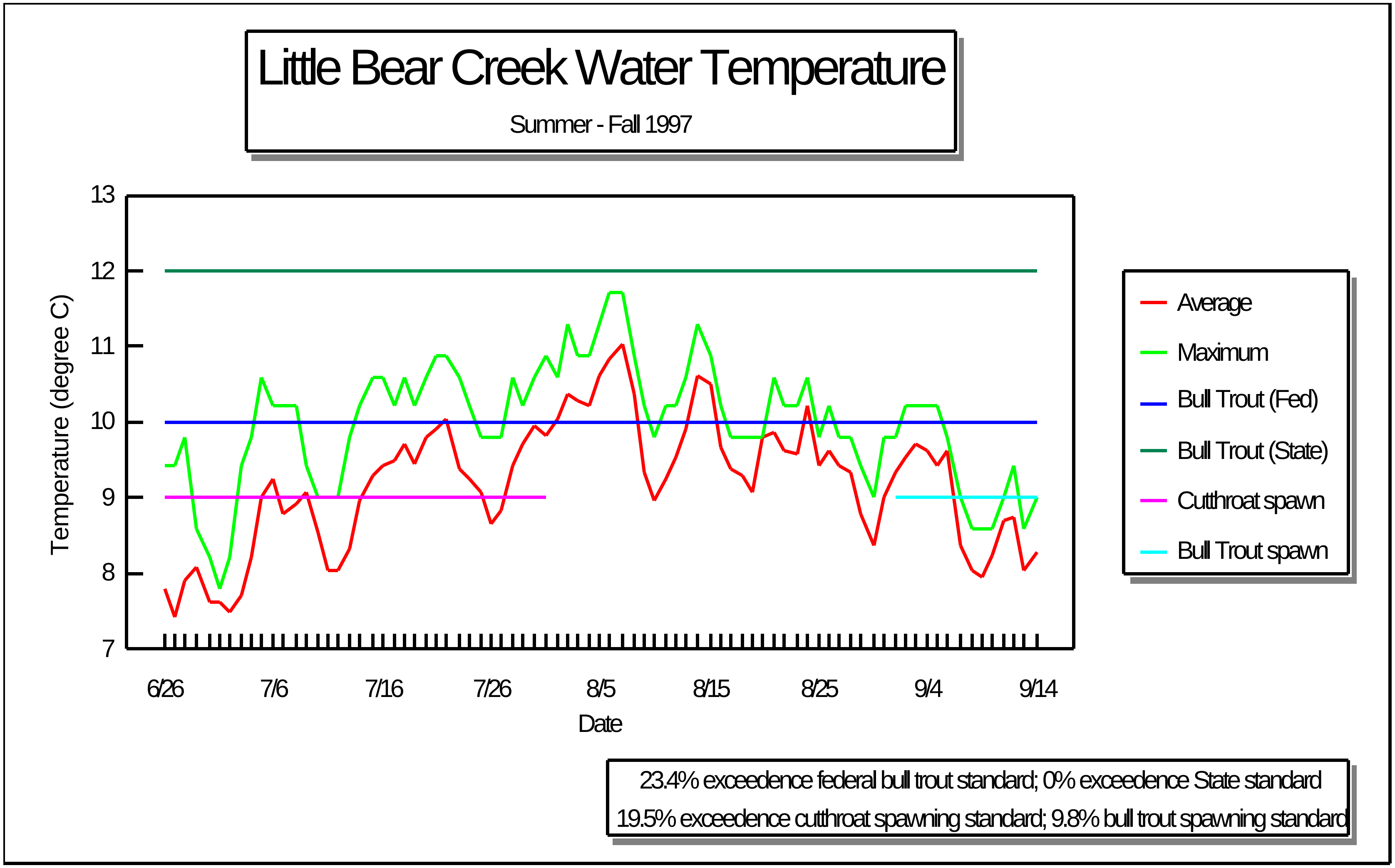

Figure B-4. Little Bear Creek Water Temperature Analysis

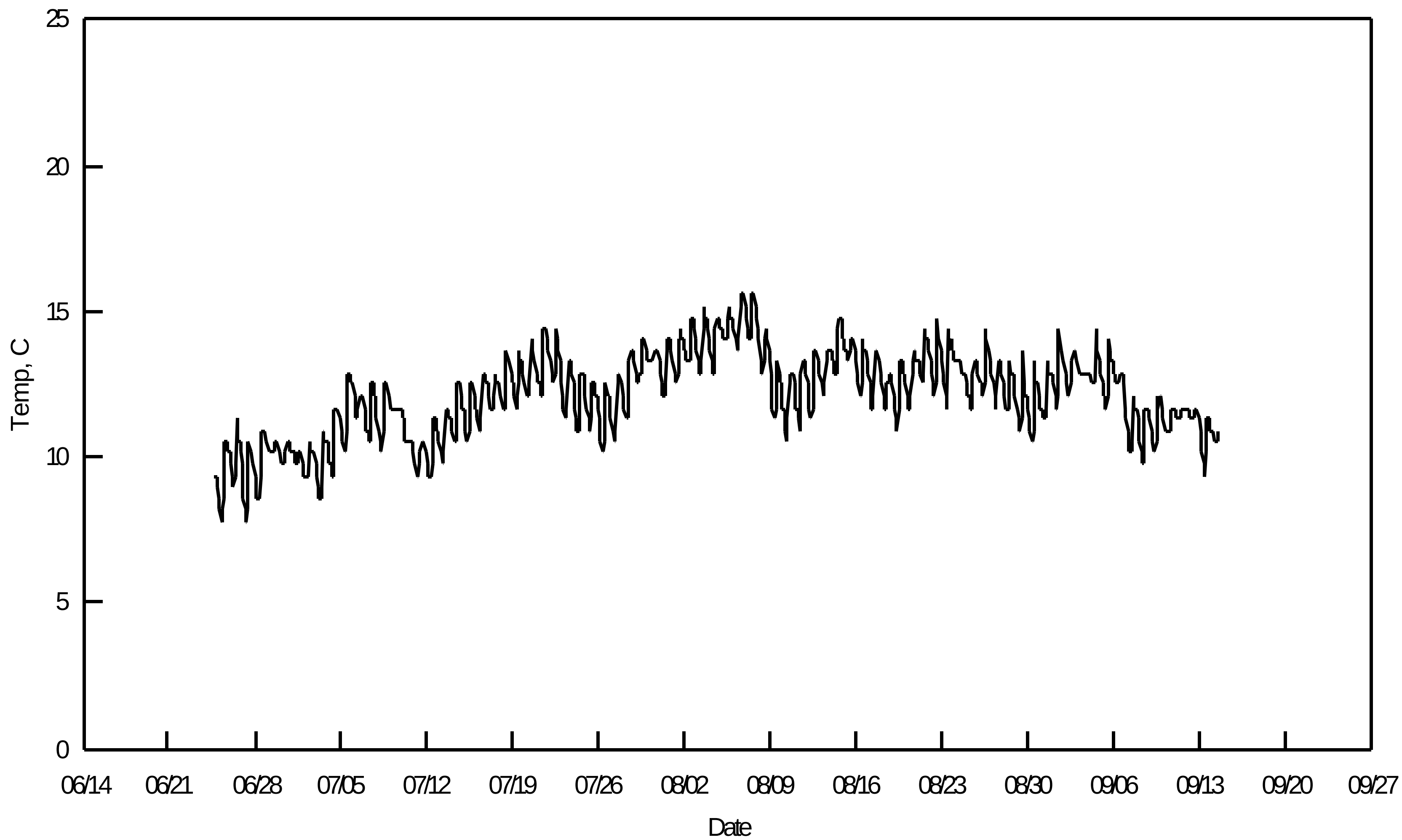

Figure B-5. Blackjack Creek Temperature Profile, Summer 1997

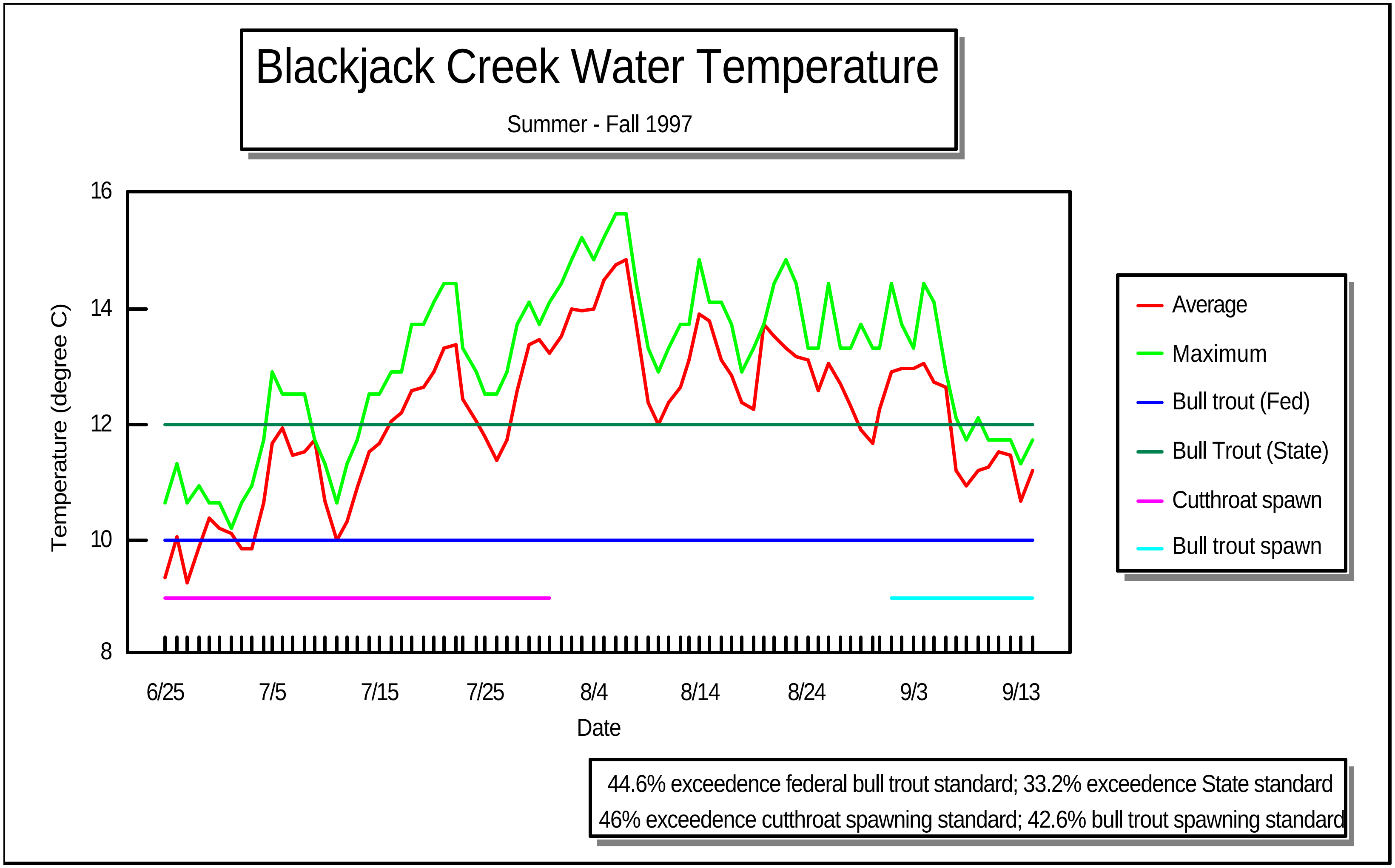

Figure B-6. Blackjack Creek Water Temperature Analysis

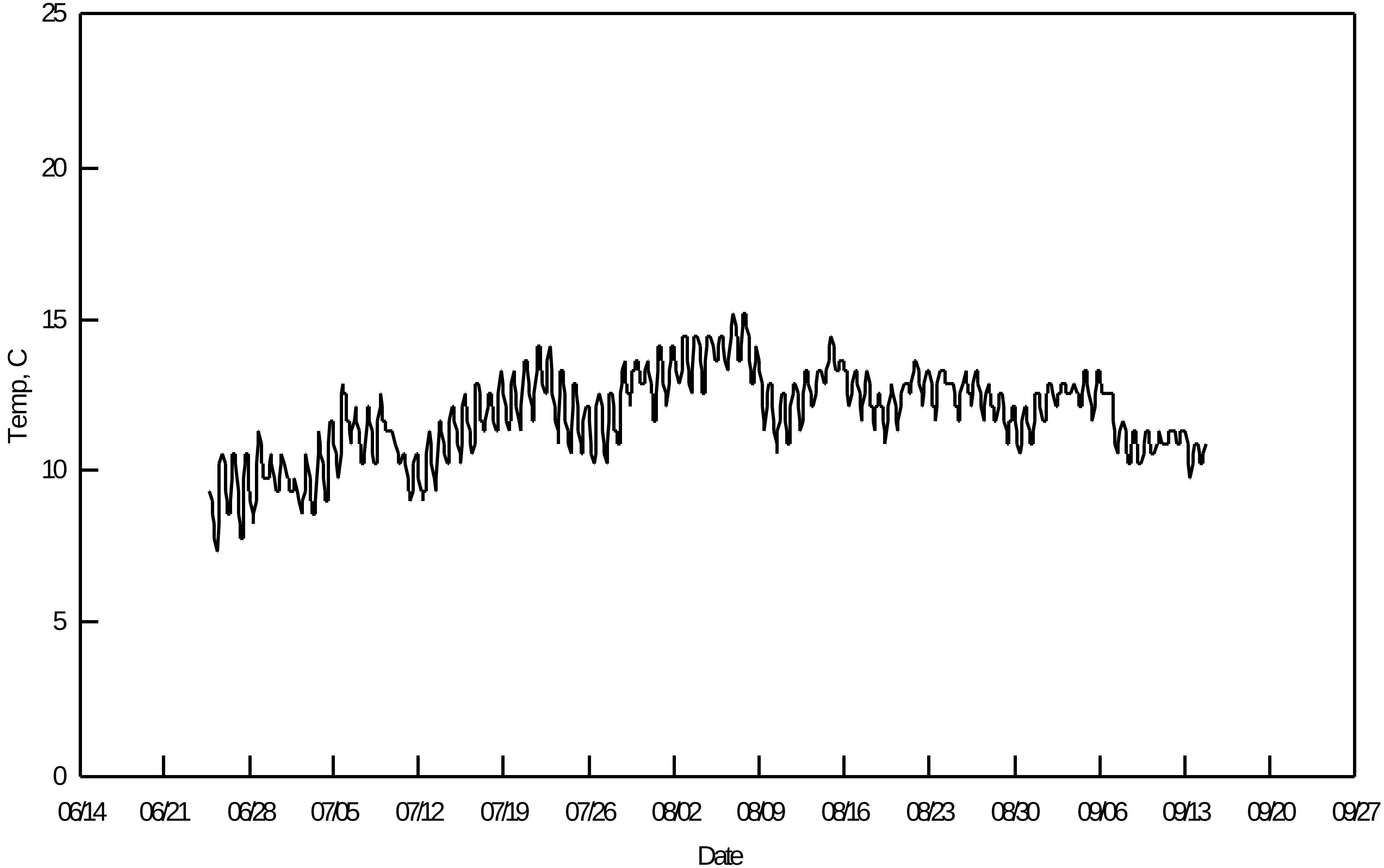

Figure B-7. Harvey Creek Temperature Profile, Summer 1997

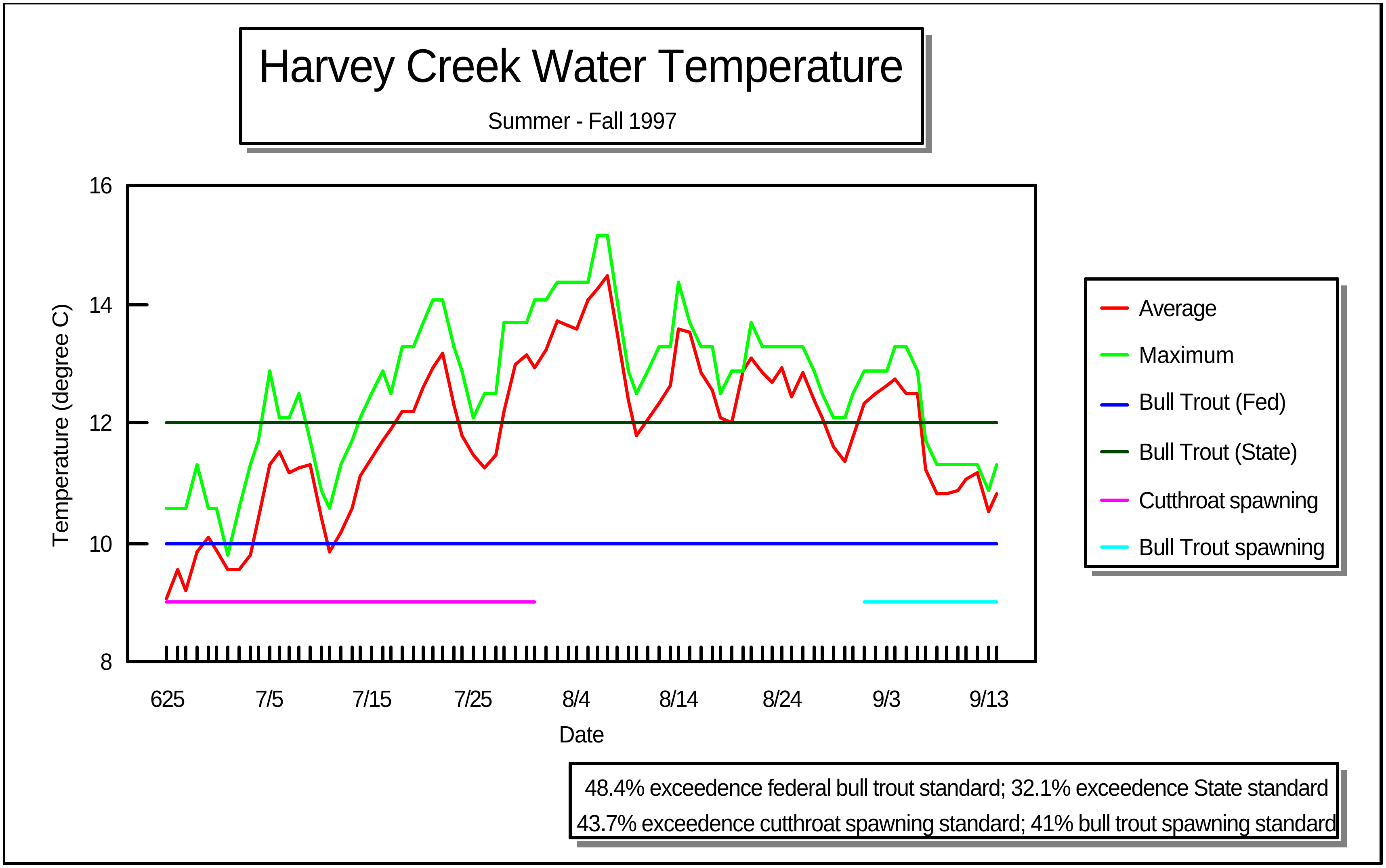

Figure B-8. Harvey Creek Water Temperature Analysis

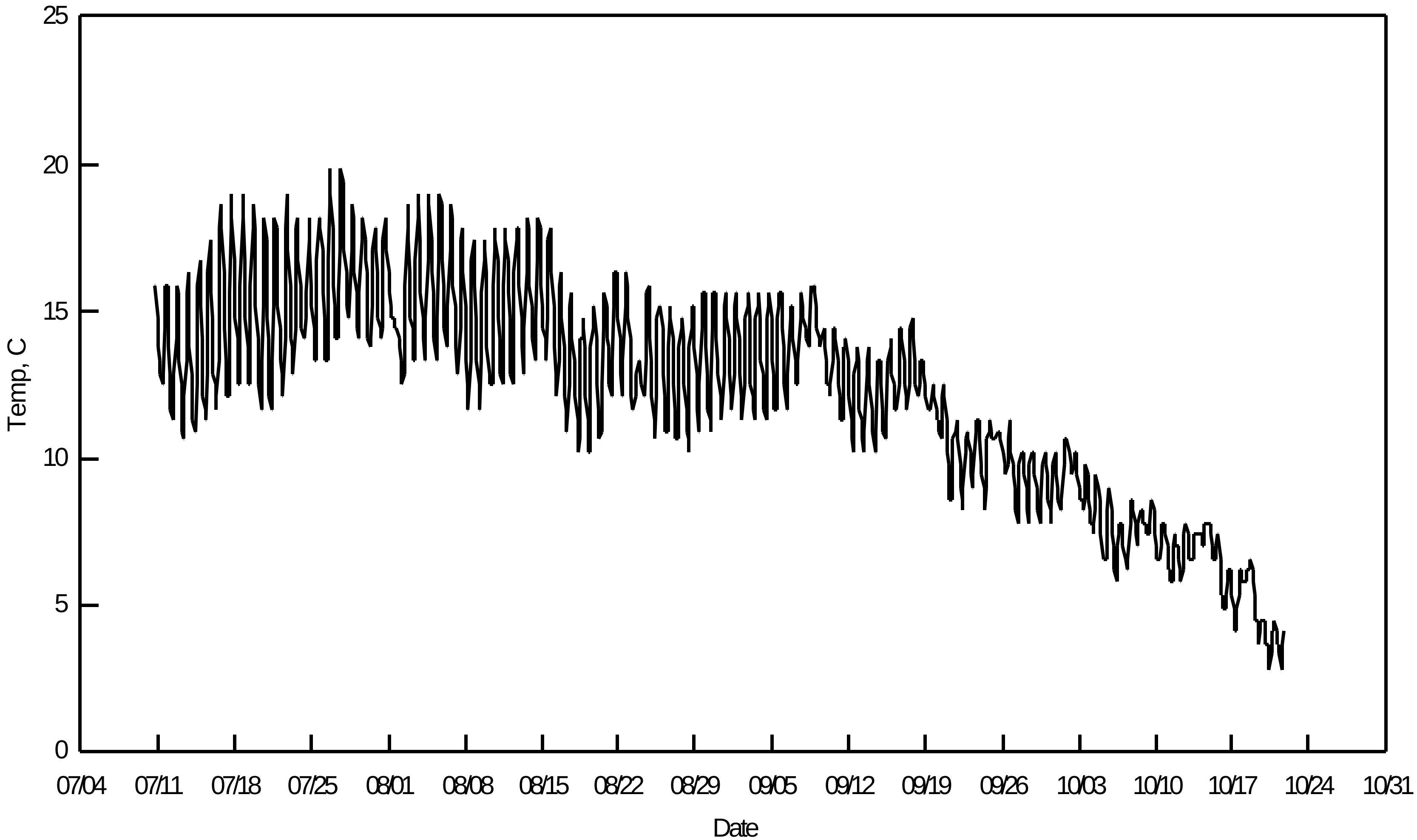

Figure B-9. Big Creek Temperature Profile, Summer 1998

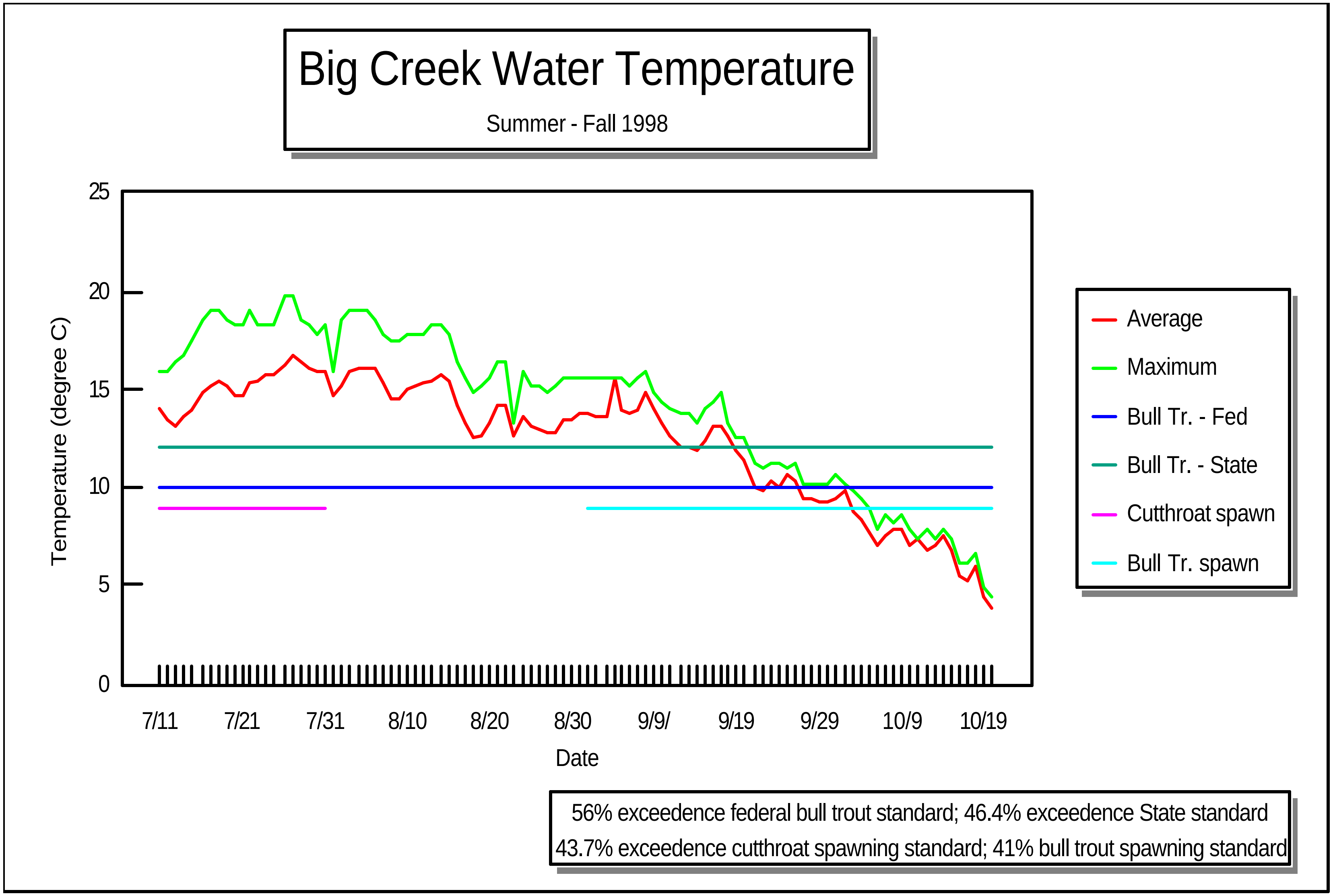

Figure B-10. Big Creek Water Temperature Analysis

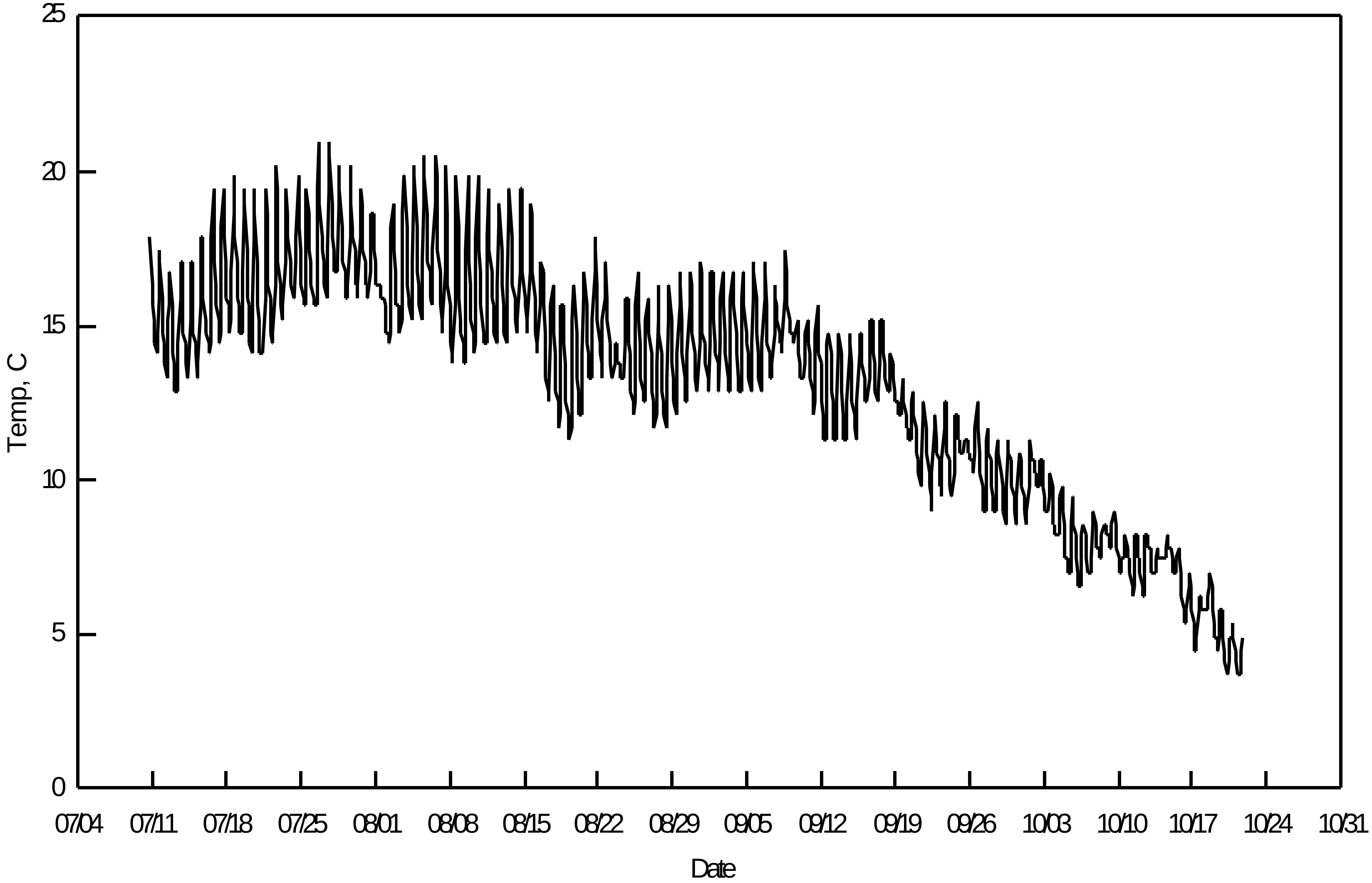

Figure B-11. East Fork Big Creek Temperature Profile, Summer 1998

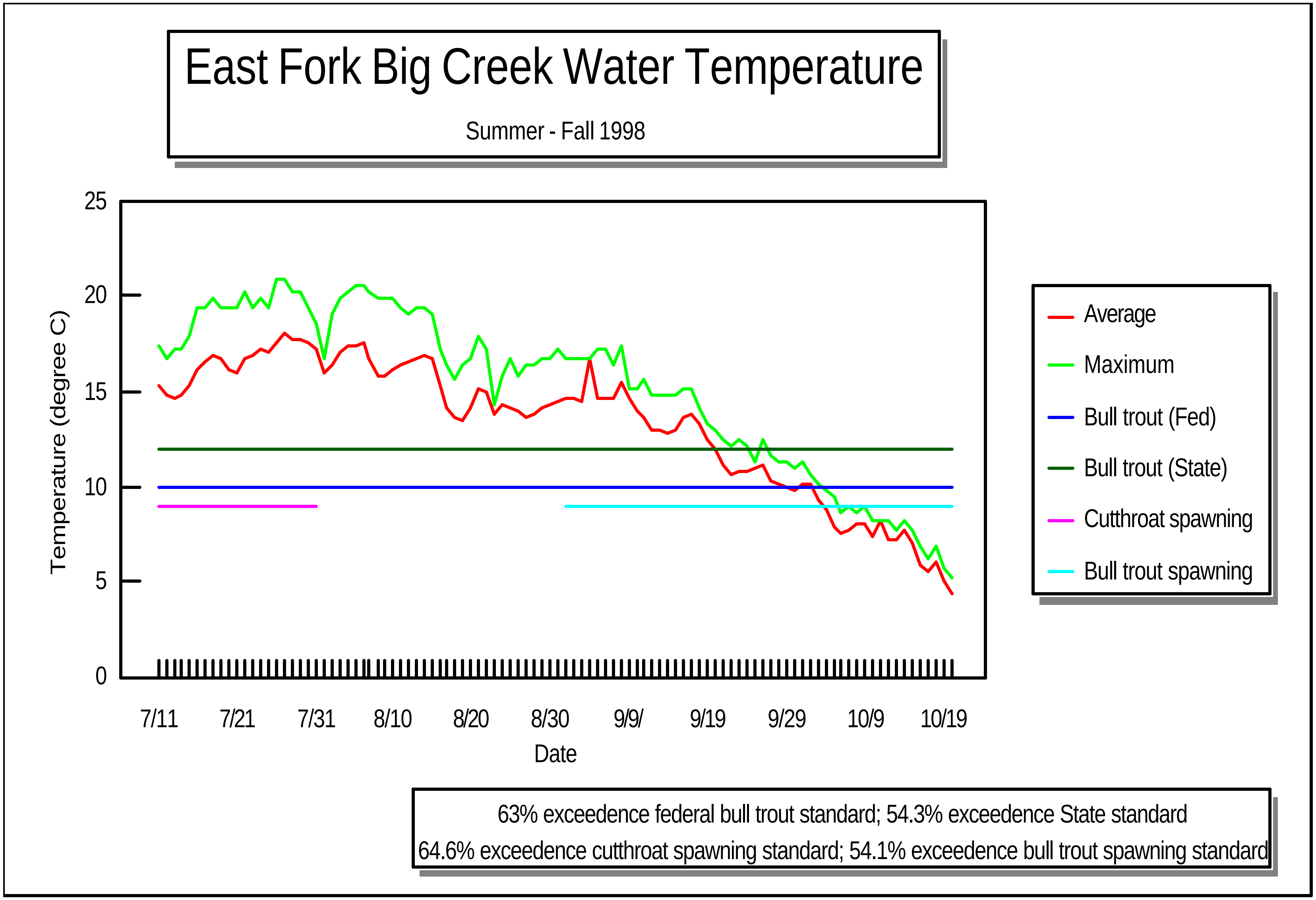

Figure B-12. East Fork Big Creek Water Temperature Analysis

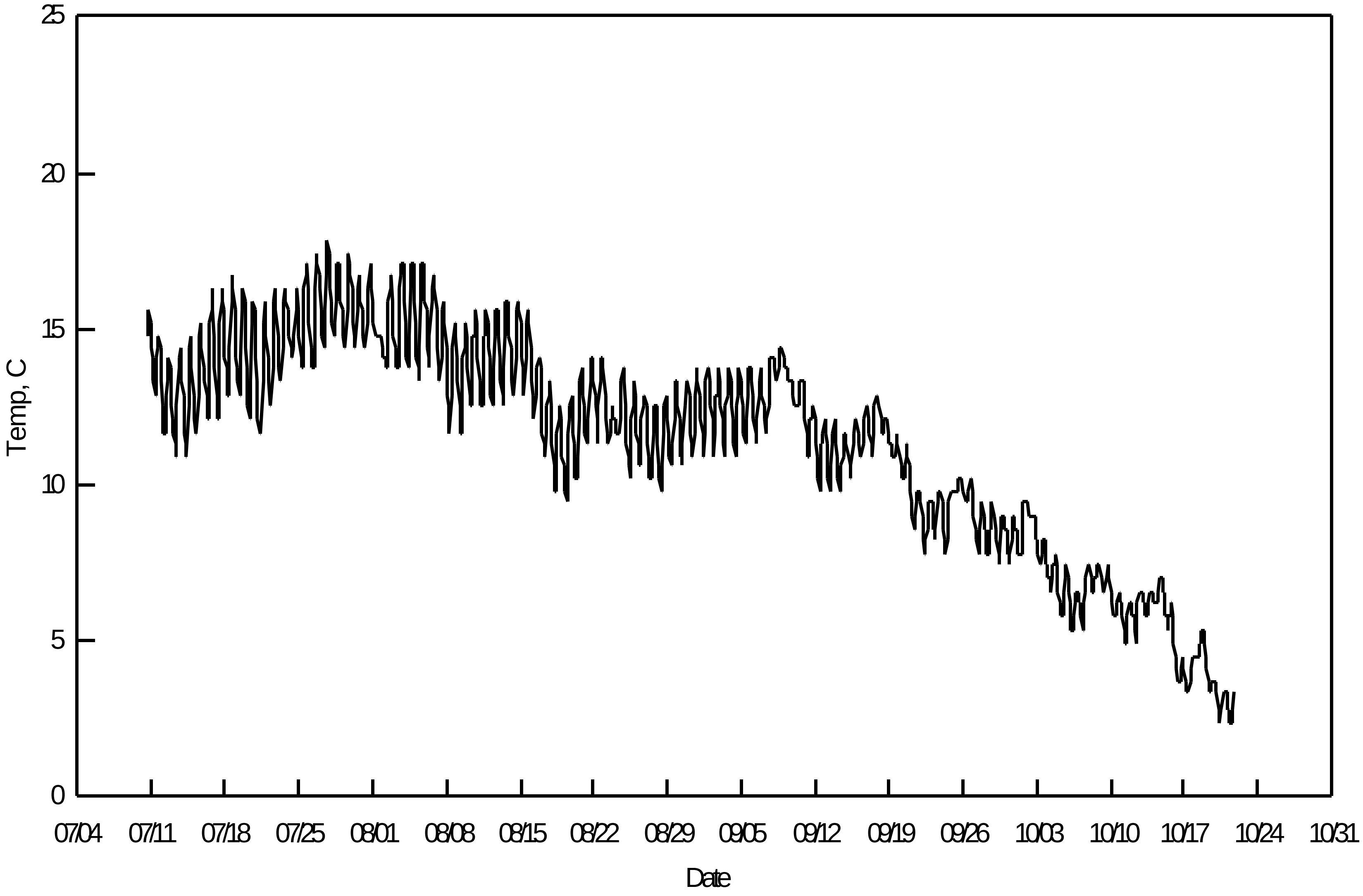

Figure B-13. Boulder Creek Temperature Profile, Summer 1998

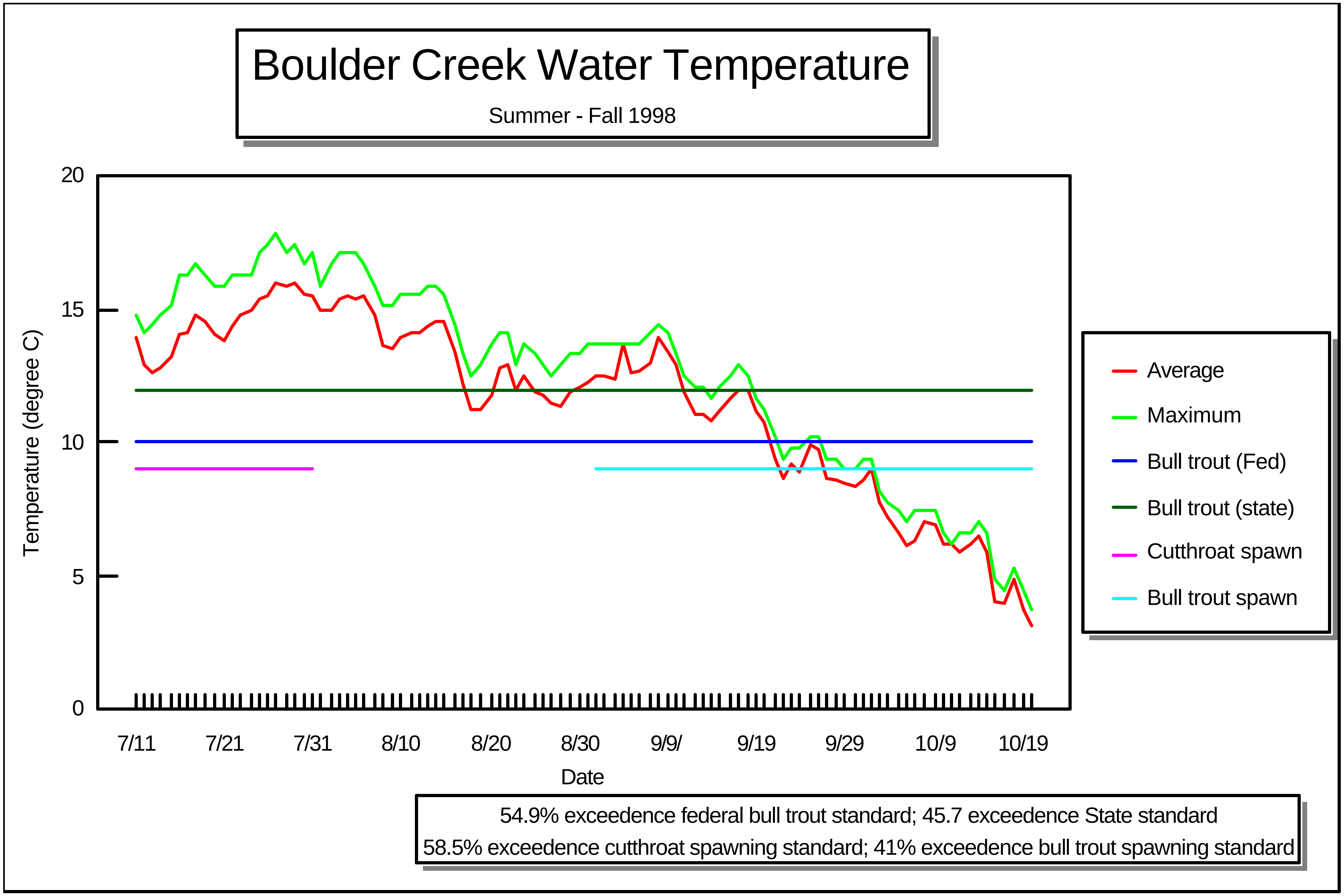

Figure B-14. Boulder Creek Water Temperature Analysis

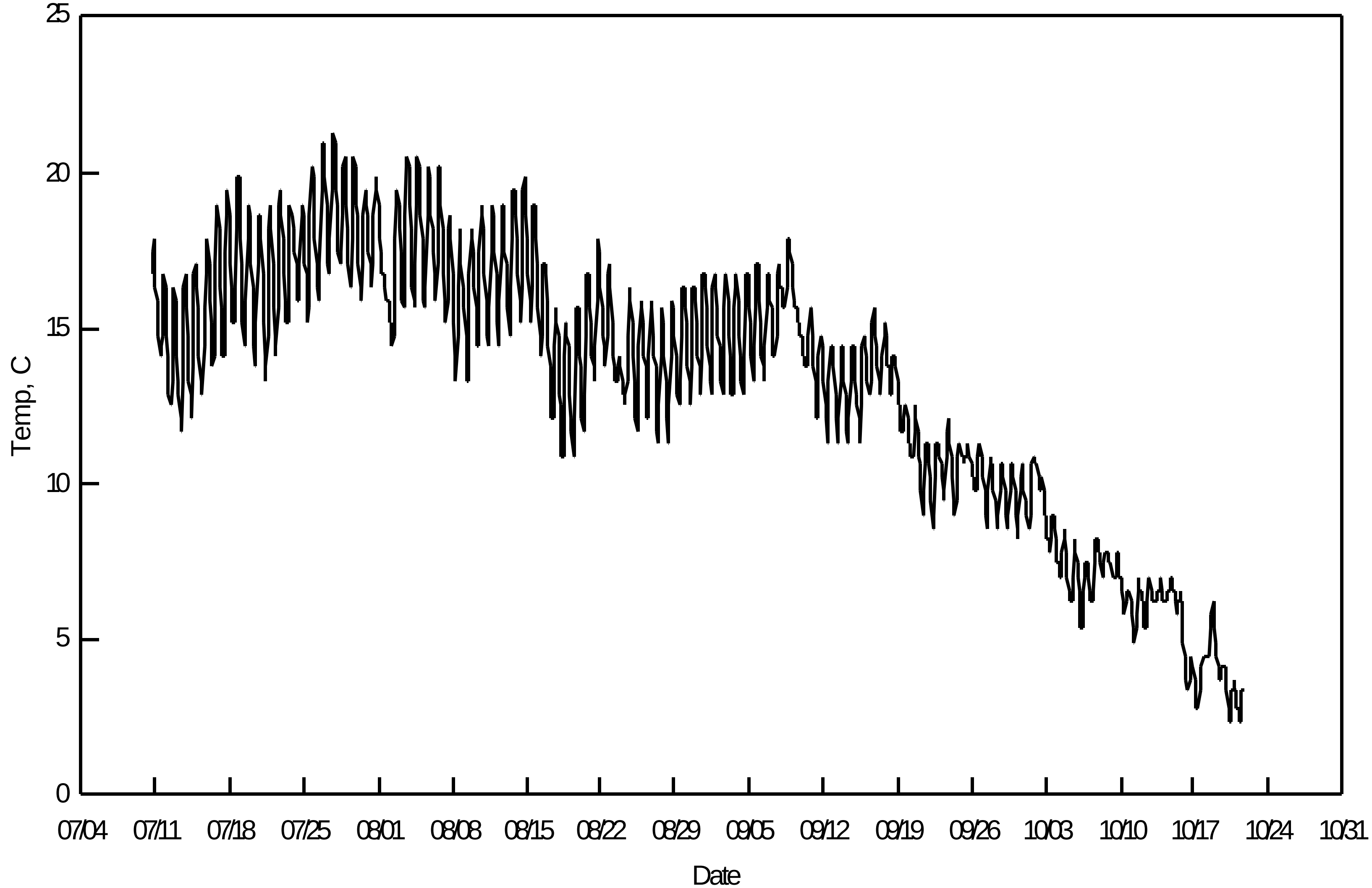

Figure B-15. Marble Creek Temperature Profile, Summer 1998

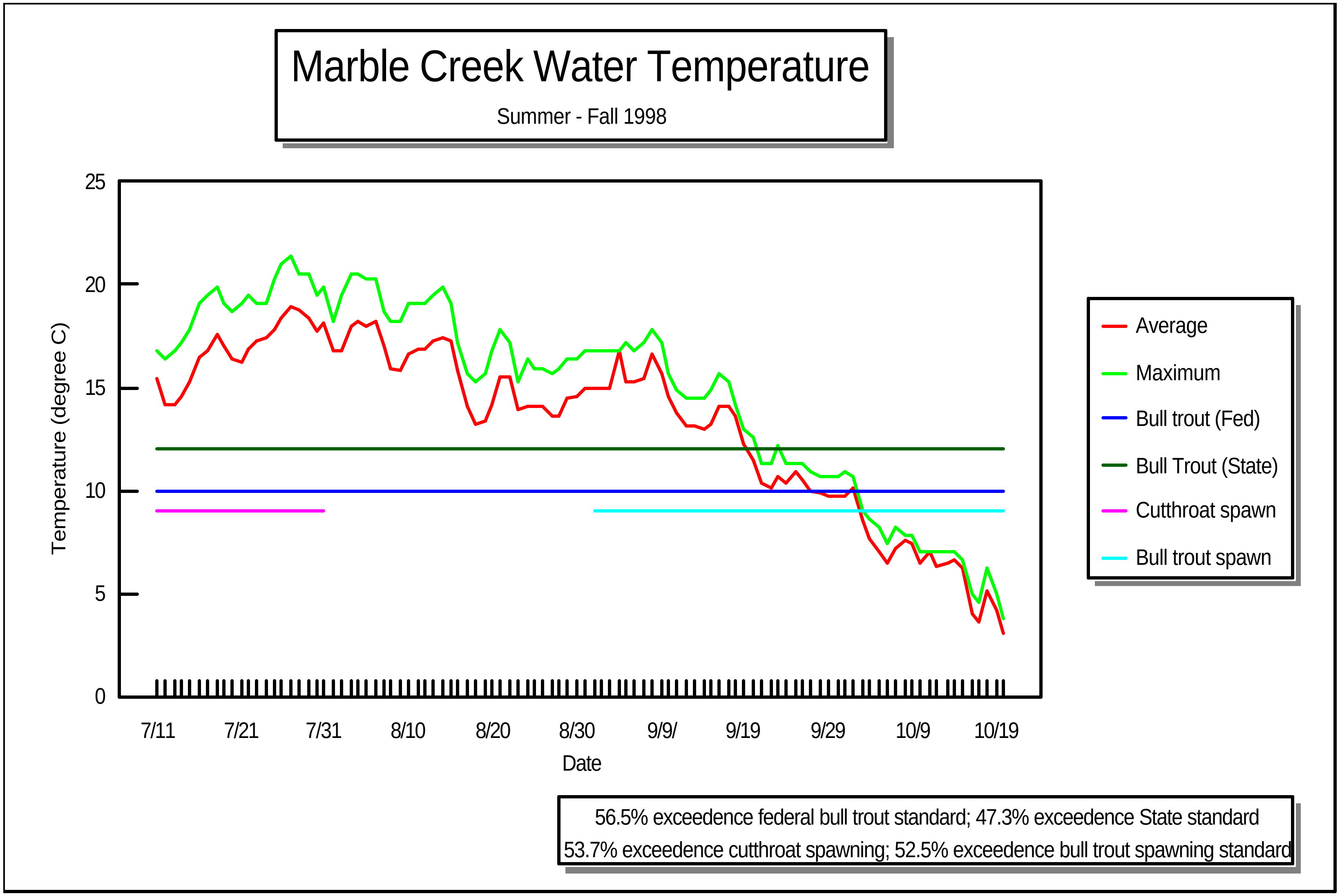

Figure B-16. Marble Creek Water Temperature Analysis

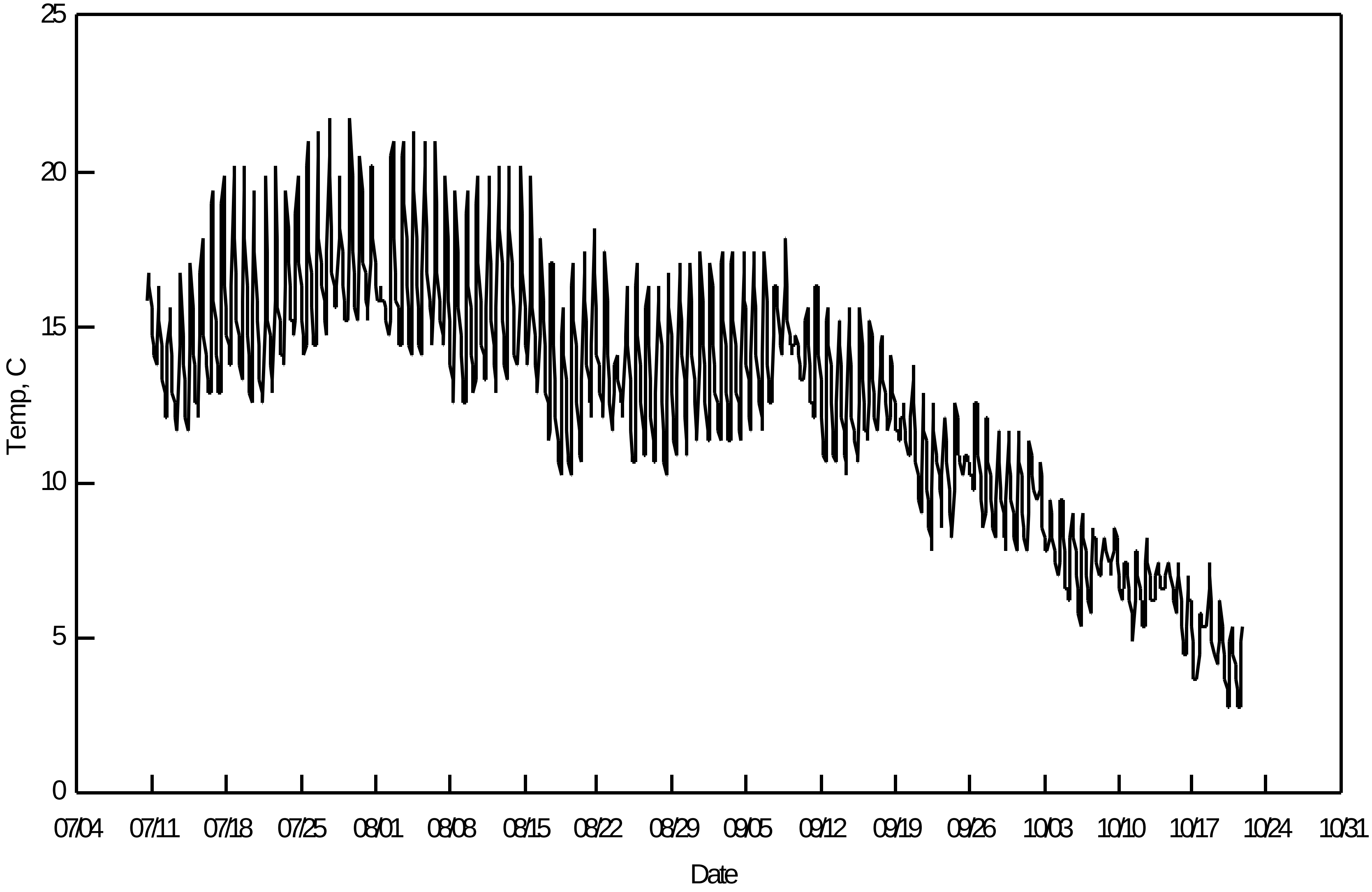

Figure B-17. Fishhook Creek Temperature Profile, Summer 1998

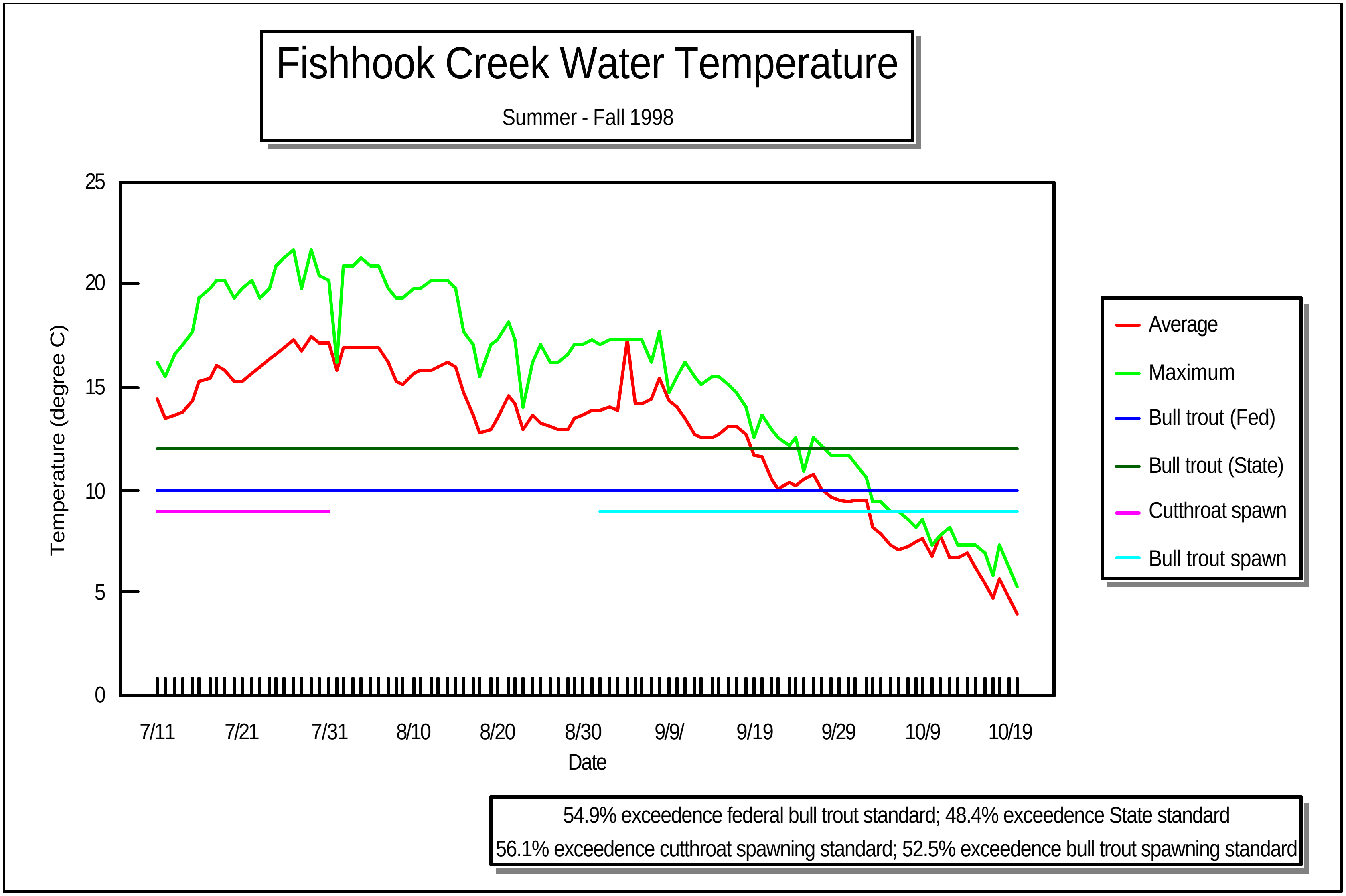

Figure B-18. Fishhook Creek Water Temperature Analysis

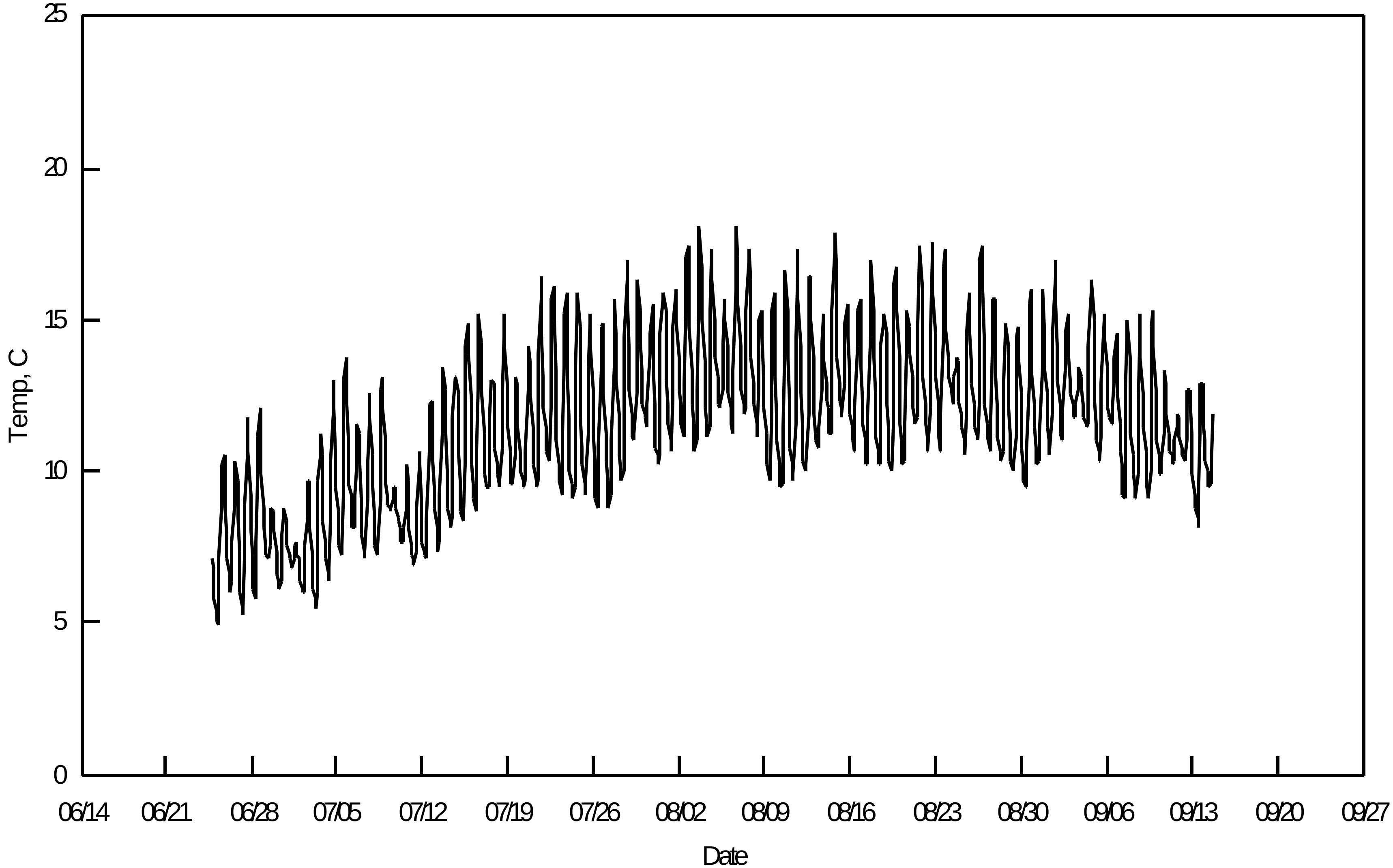

Figure B-19. Loop Creek Temperature Profile, Summer 1997

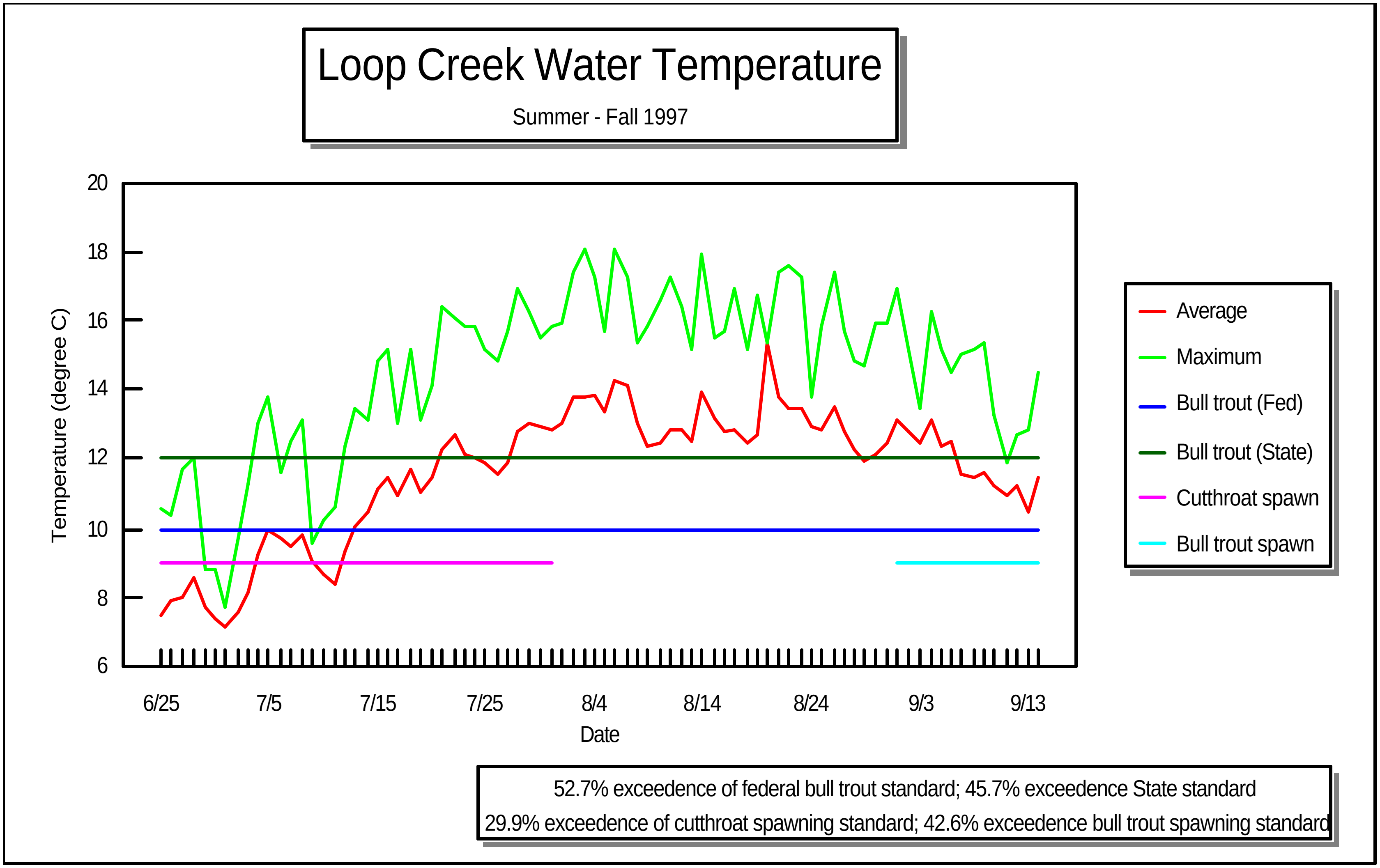

Figure B-20. Loop Creek Water Temperature Analysis

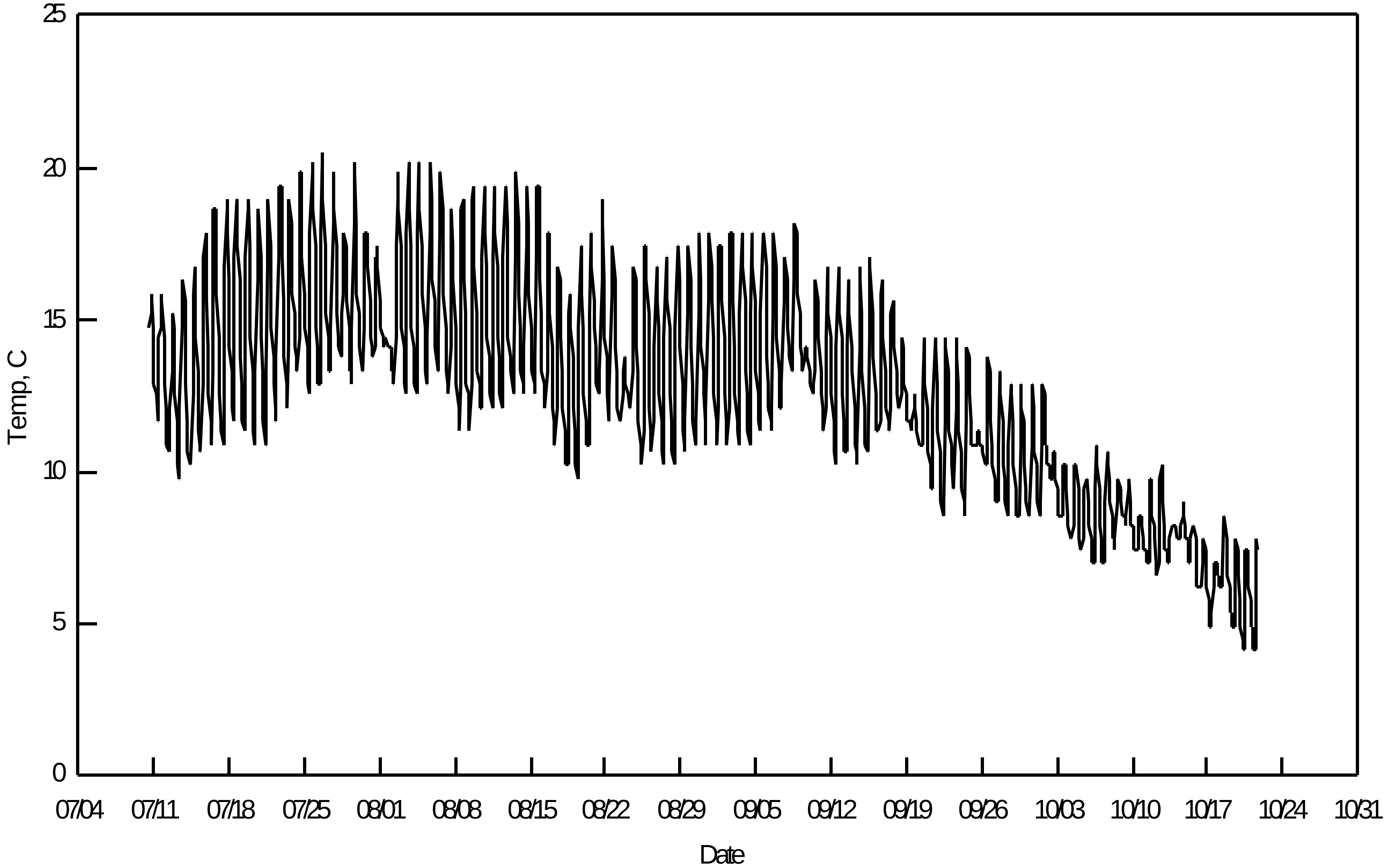

Figure B-21. North Fork St. Joe River Temperature Profile, Summer 1997

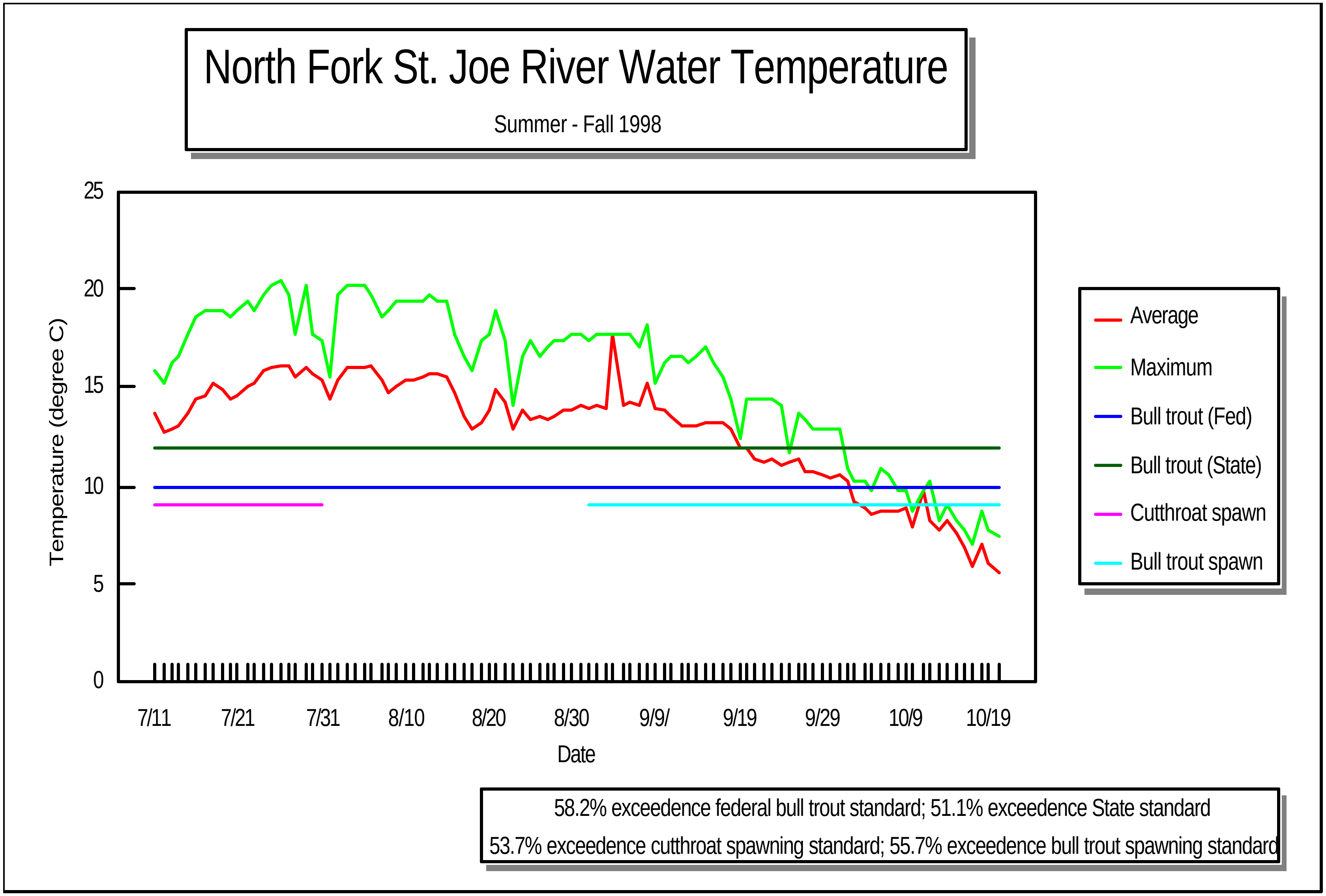

Figure B-22. North Fork St. Joe River Water Temperature Analysis

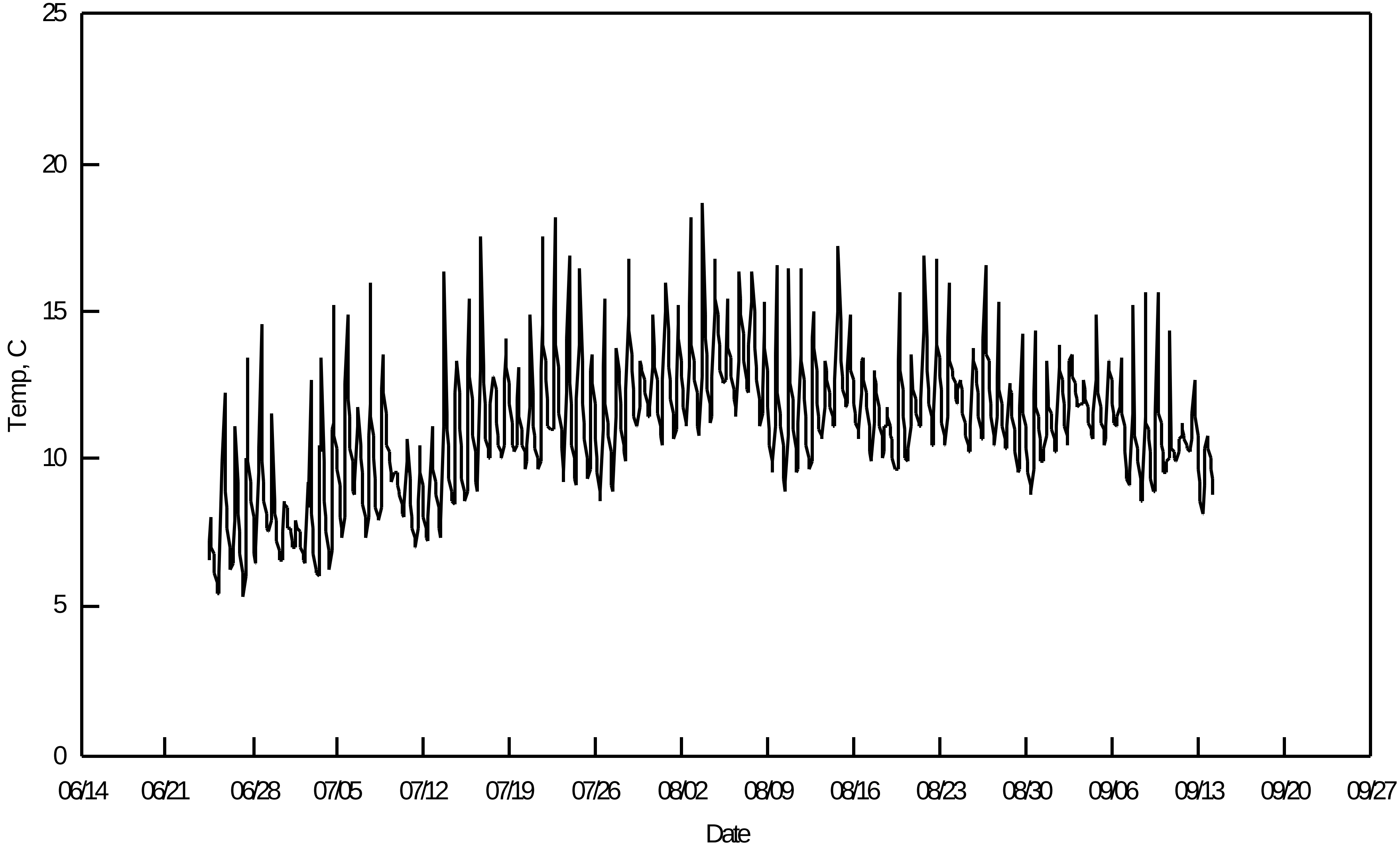

Figure B-23. Bluff Creek Water Temperature Profile, Summer 1997

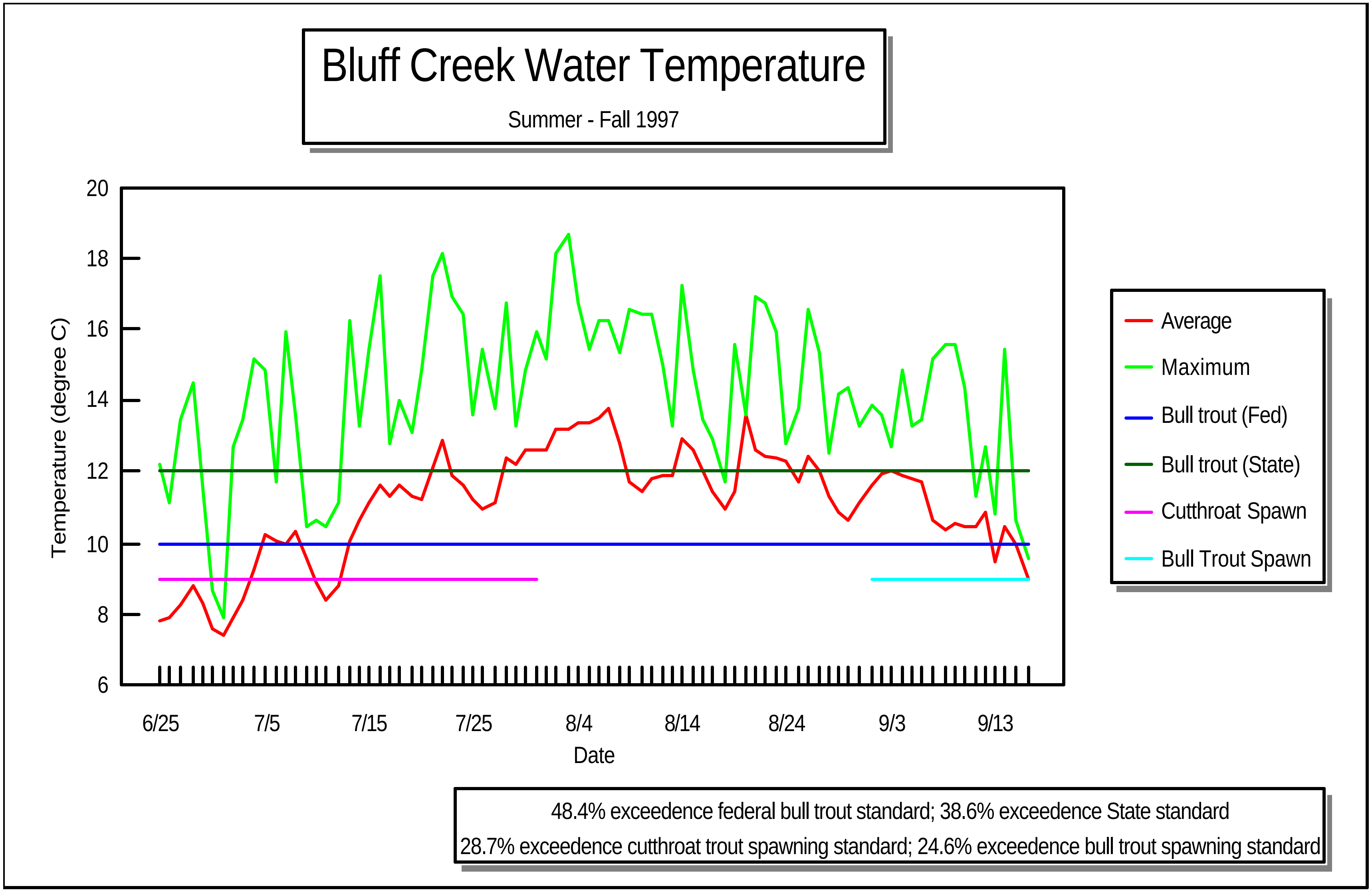

Figure B-24. Bluff Creek Water Temperature Analysis

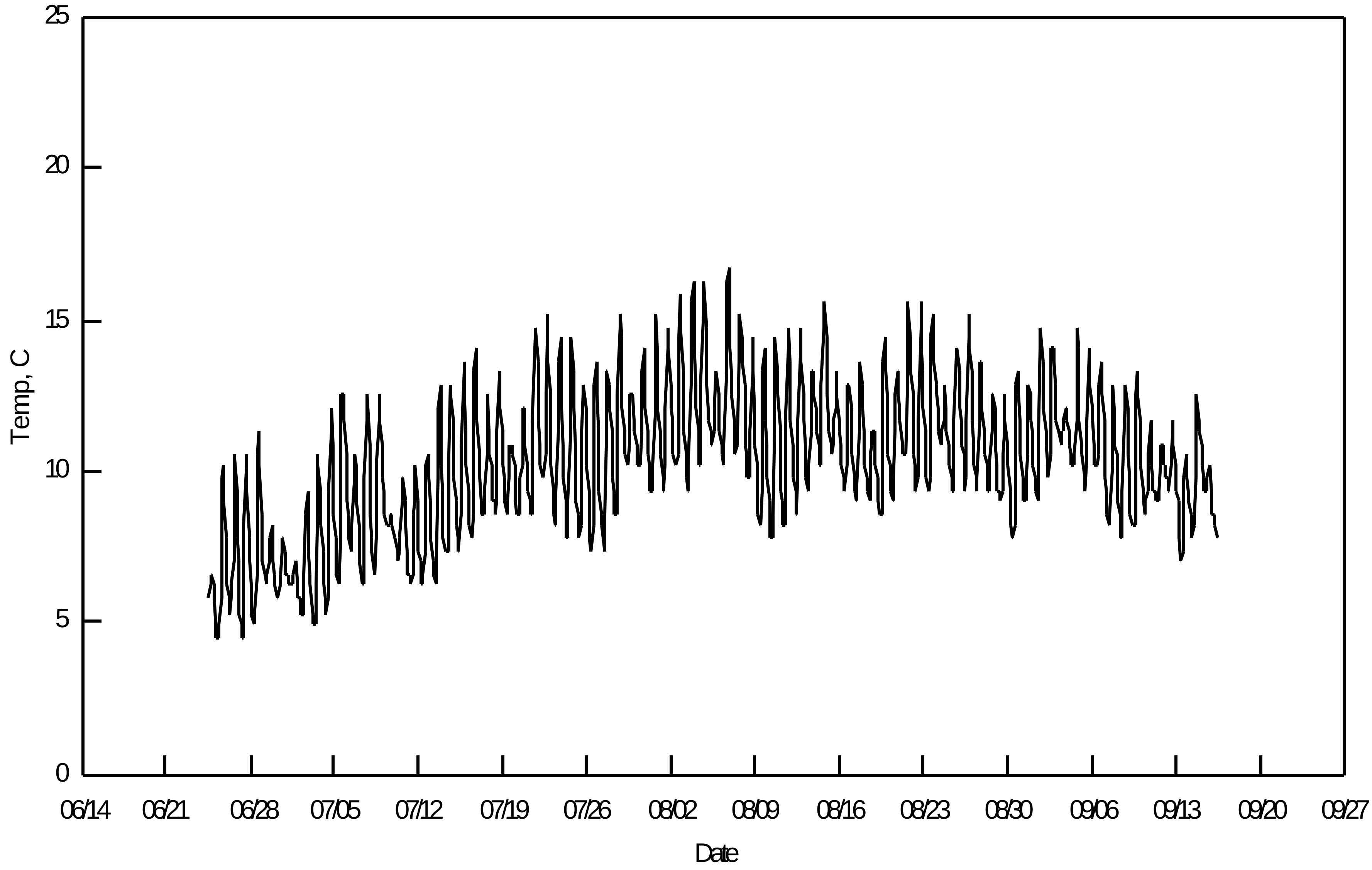

Figure B-25. Gold Creek Temperature Profile, Summer 1997

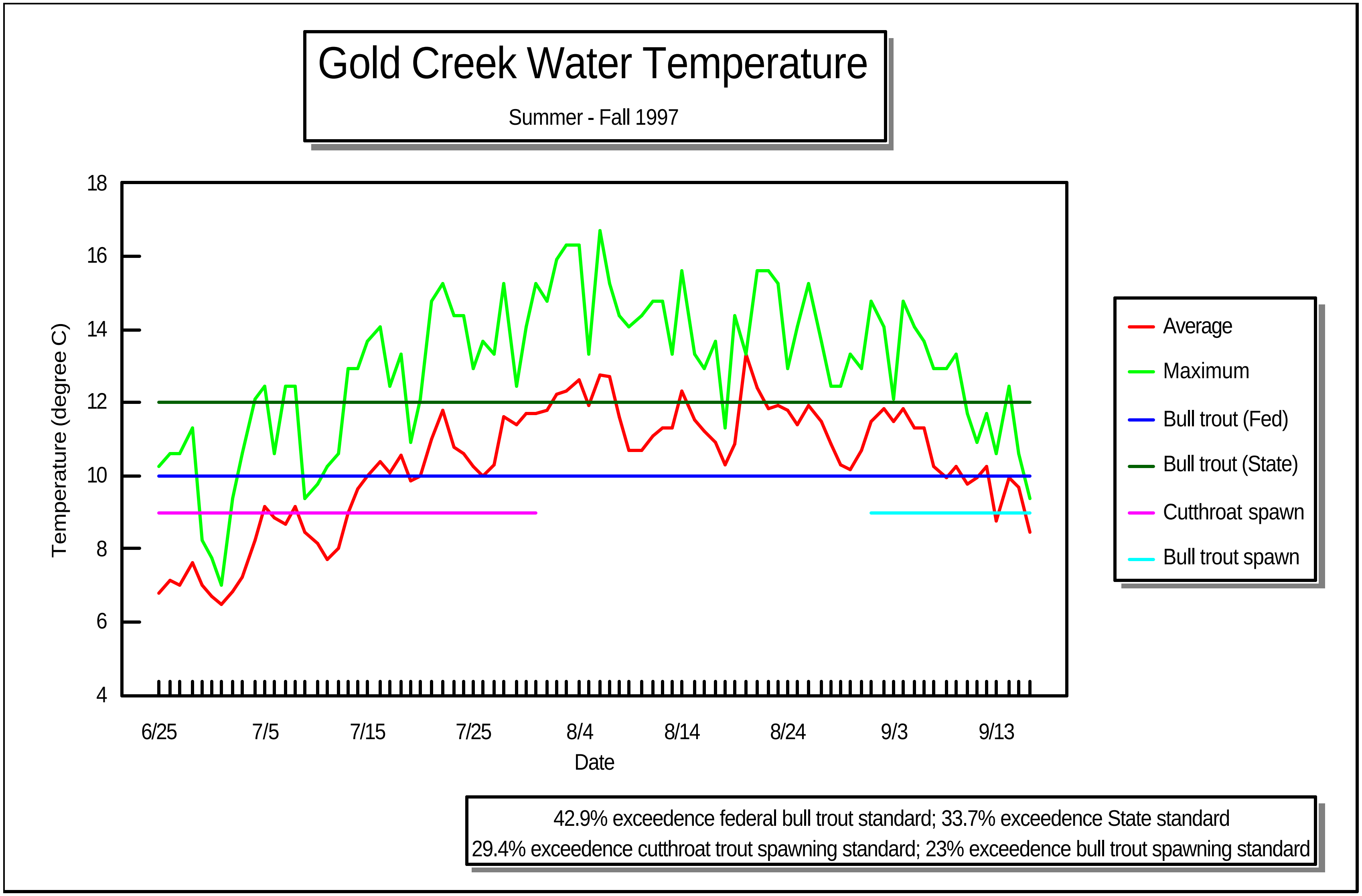

Figure B-26. Gold Creek Water Temperature Analysis

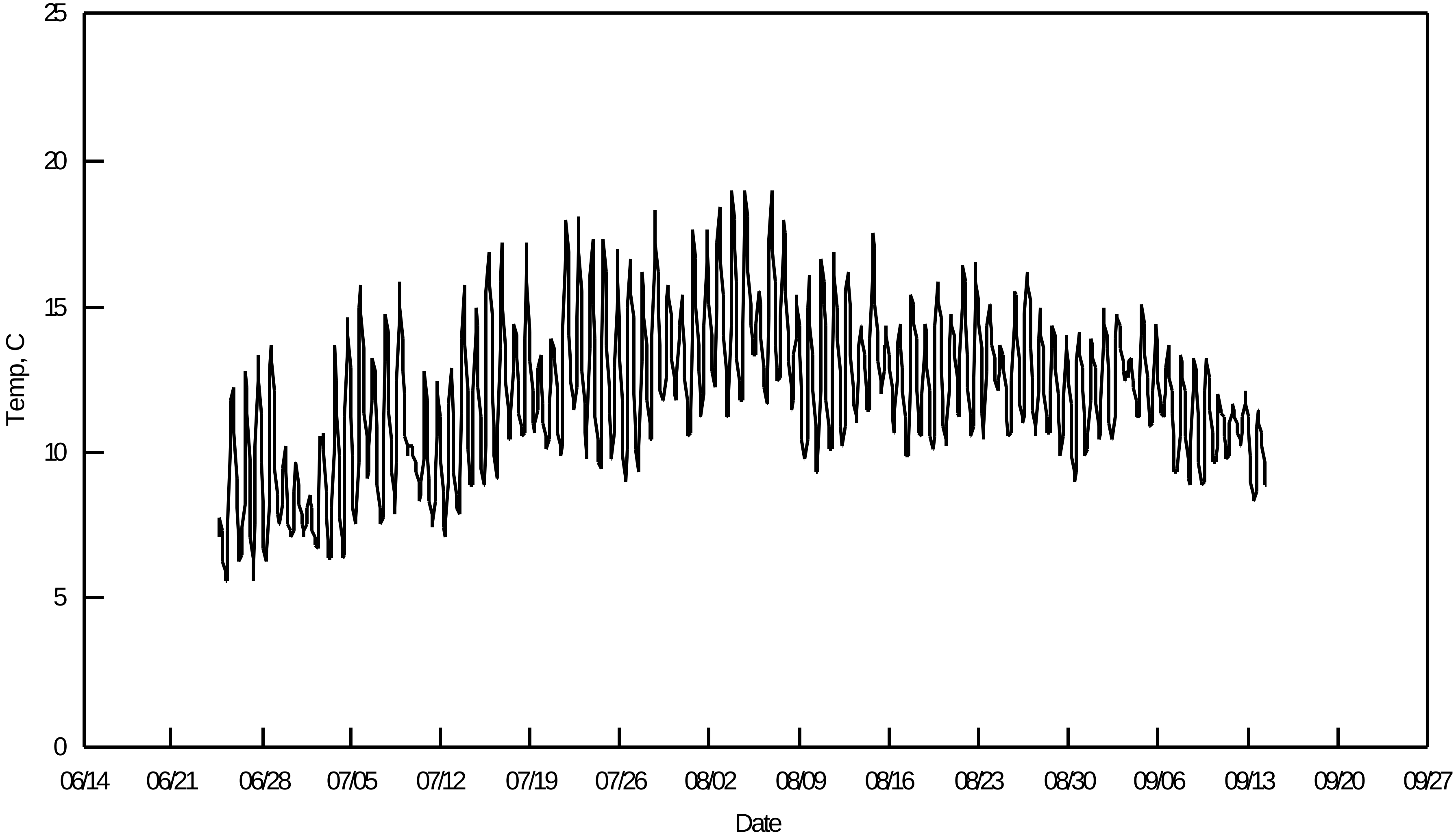

Figure B-27. Beaver Creek Temperature Profile, Summer 1997

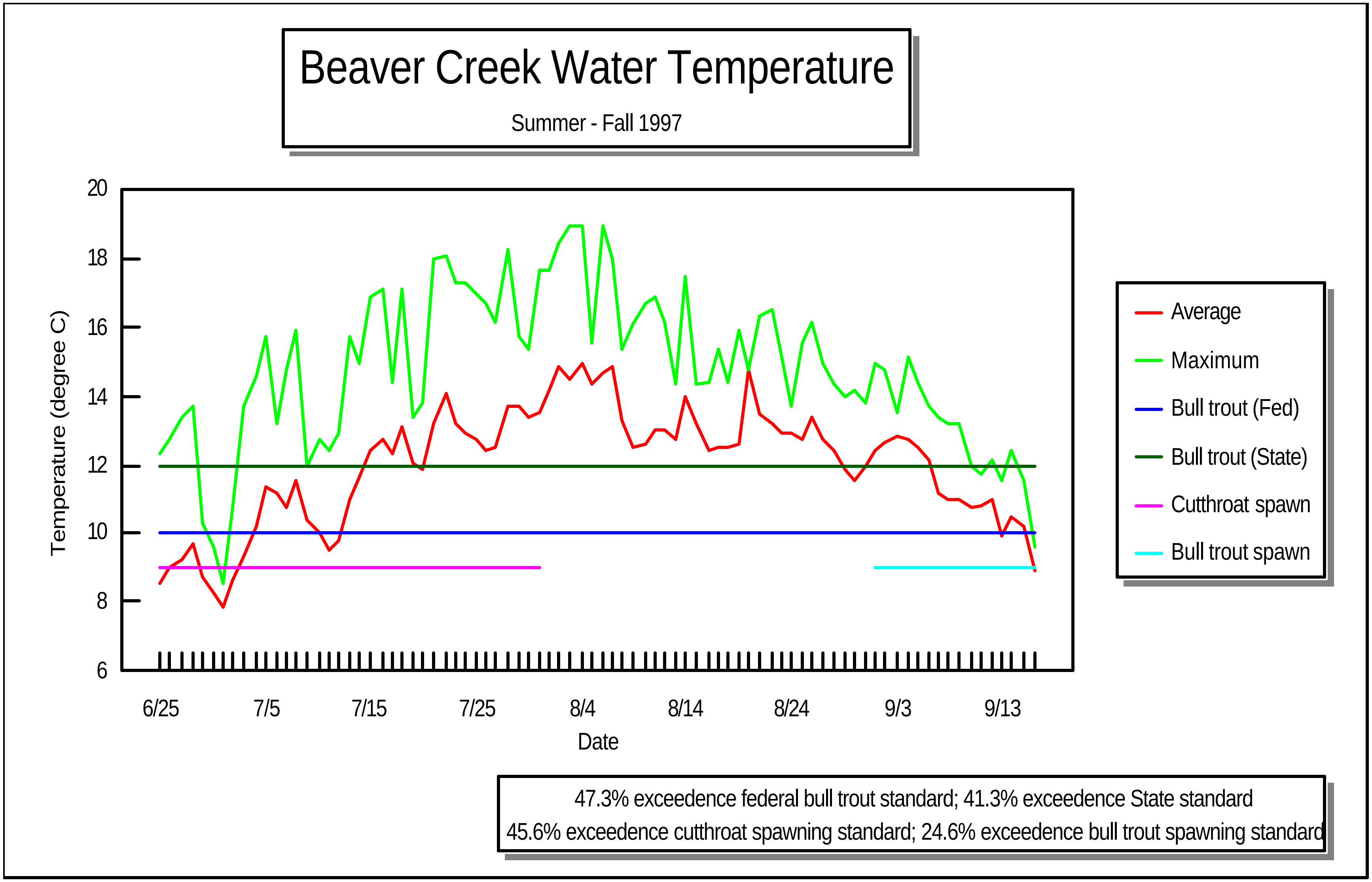

Figure B-28. Beaver Creek Water Temperature Analysis

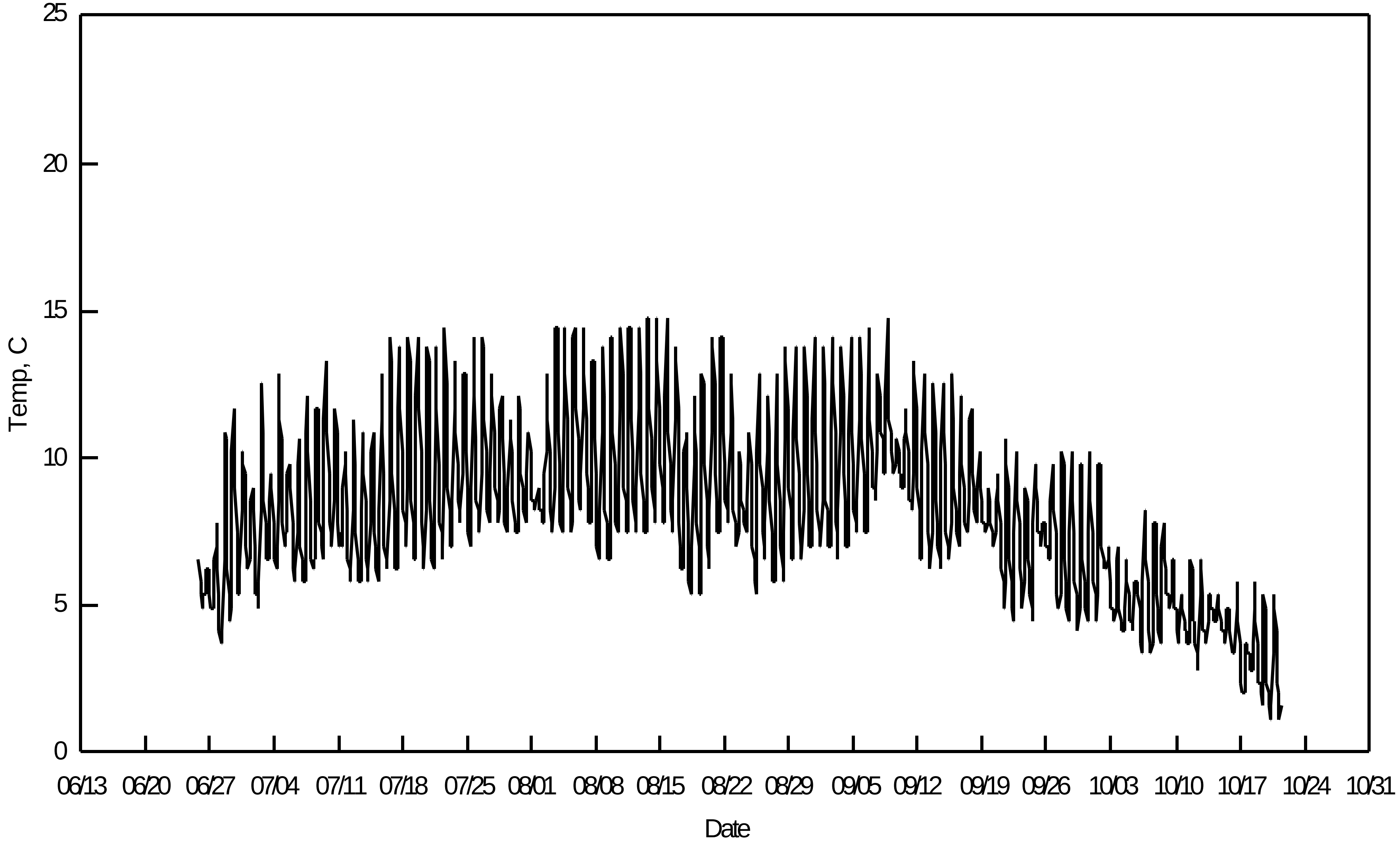

Figure B-29. Heller Creek Temperature Profile, Summer 1998

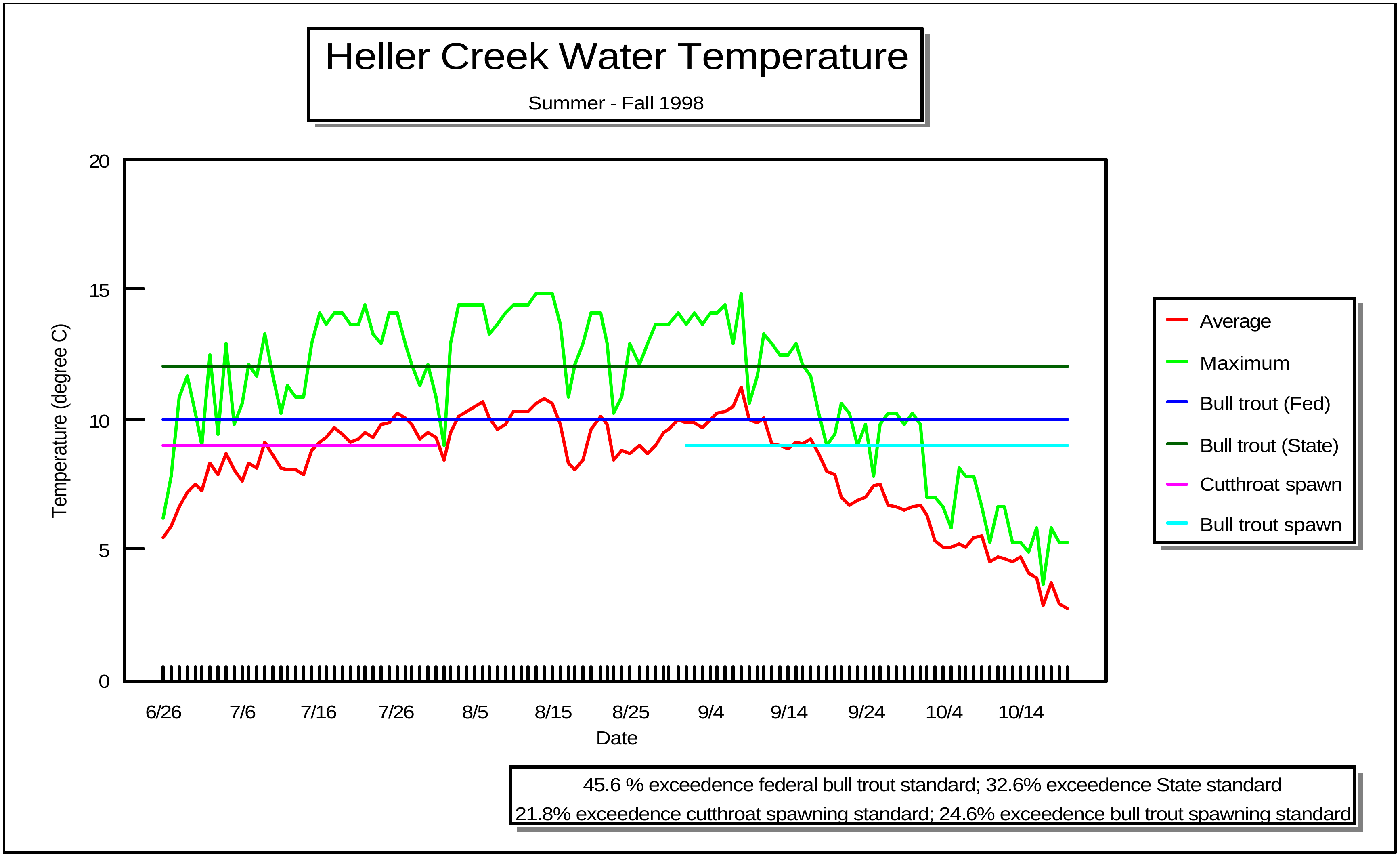

Figure B-30. Heller Creek Water Temperature Analysis

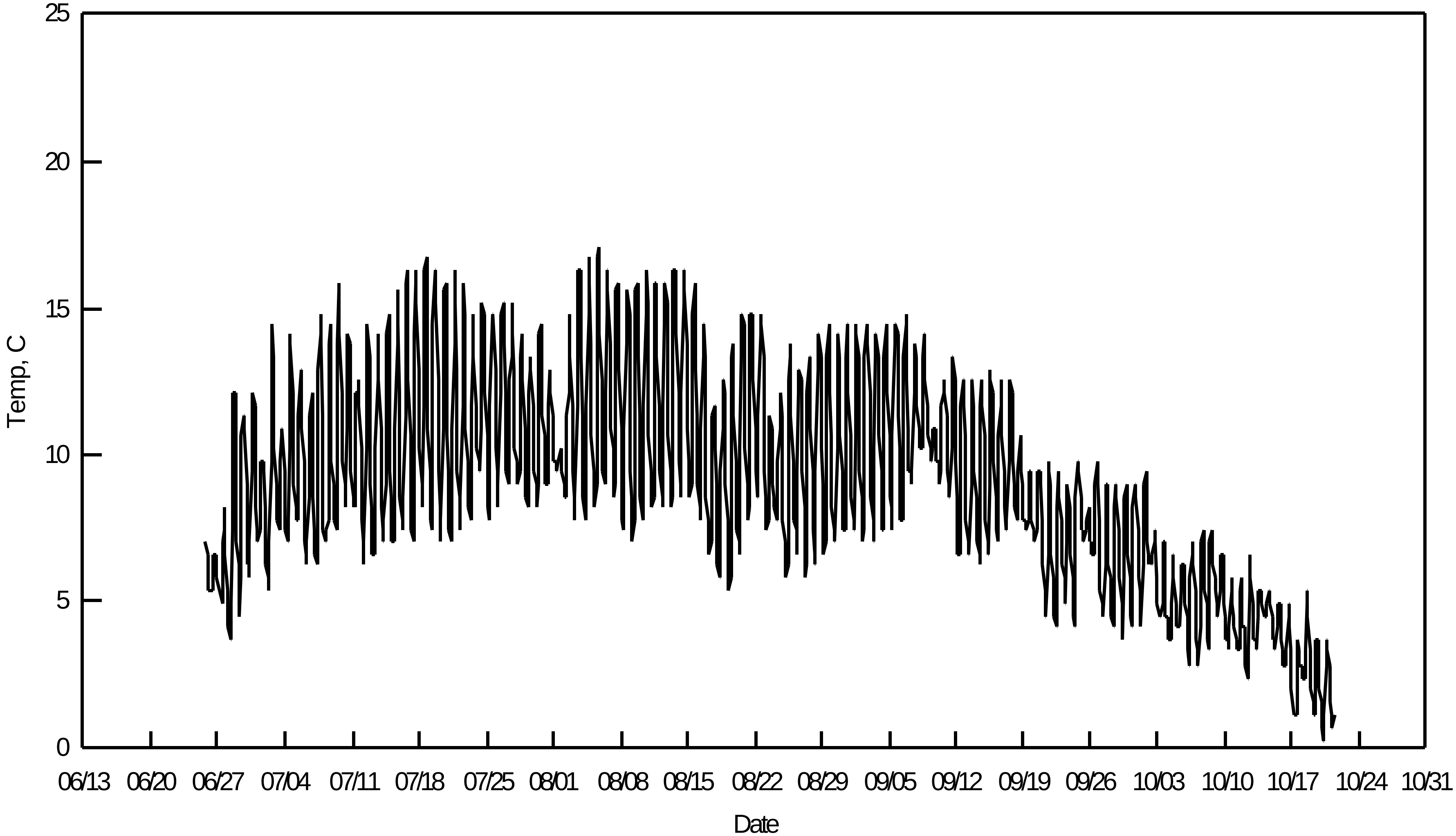

Figure B-31. Sherlock Creek Temperature Profile, Summer 1998

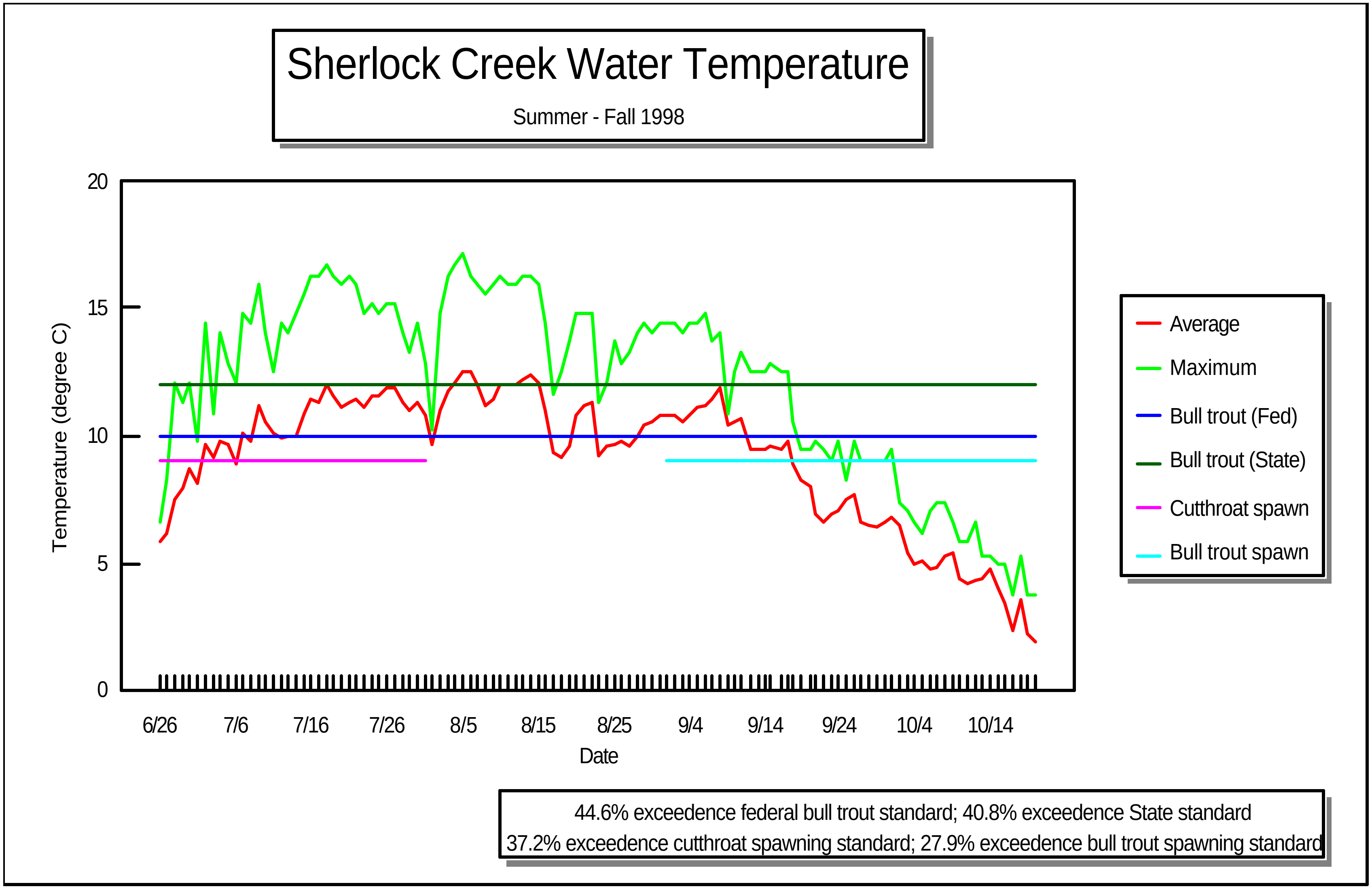

Figure B-32. Sherlock Creek Water Temperature Analysis

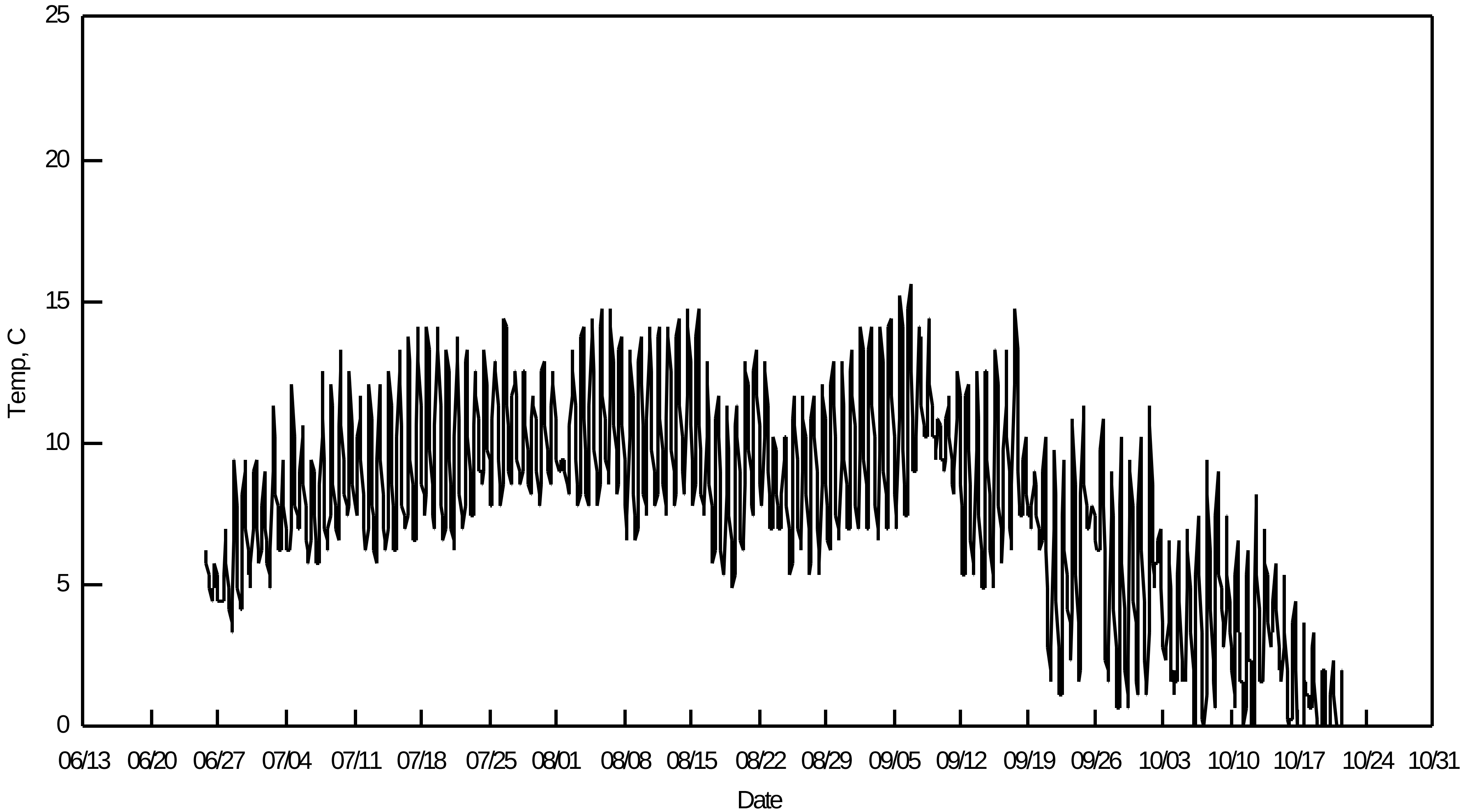

Figure B-33. Yankee Bar Creek Temperature Profile, Summer 1998

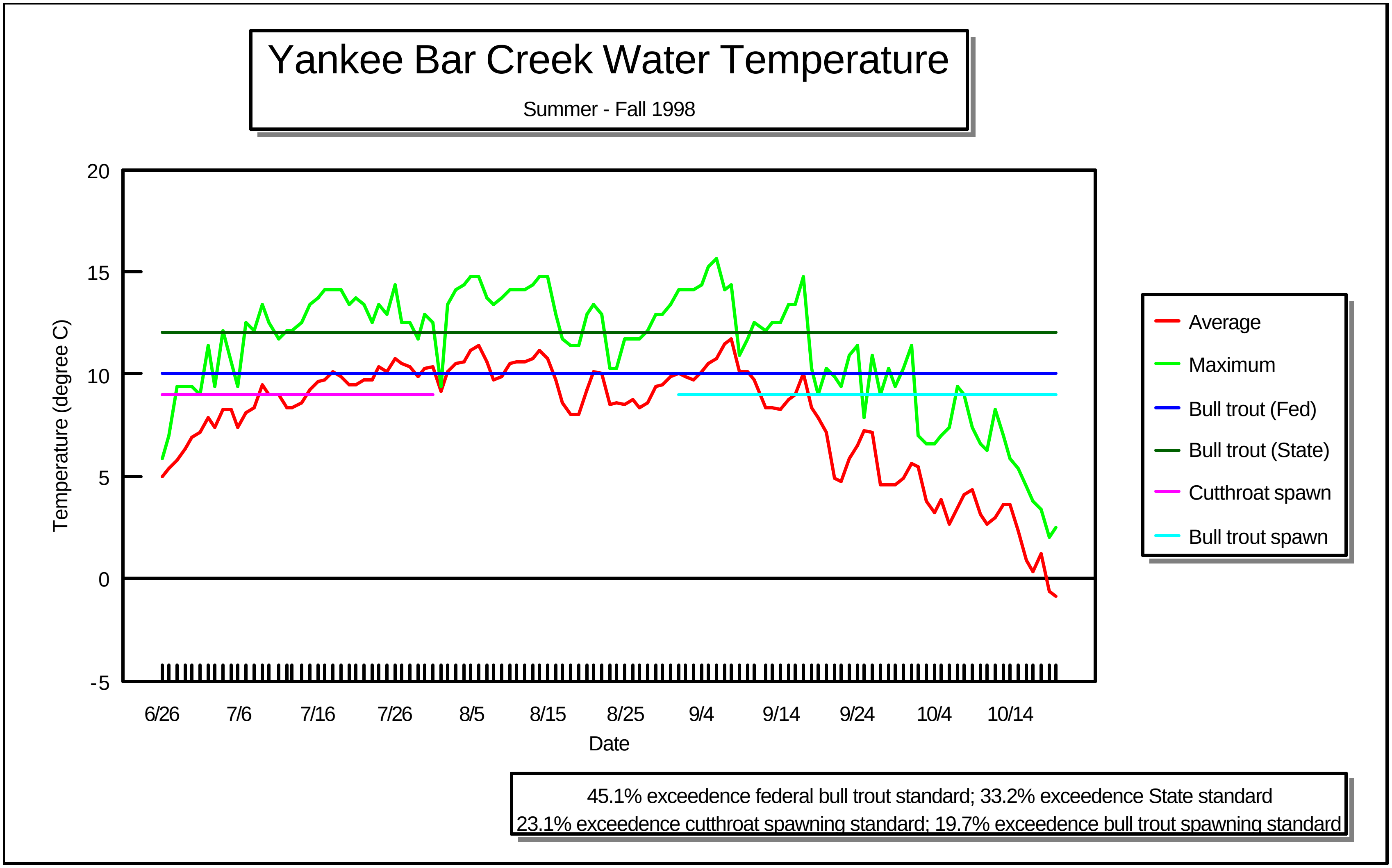

Figure B-34. Yankee Bar Creek Water Temperature Analysis

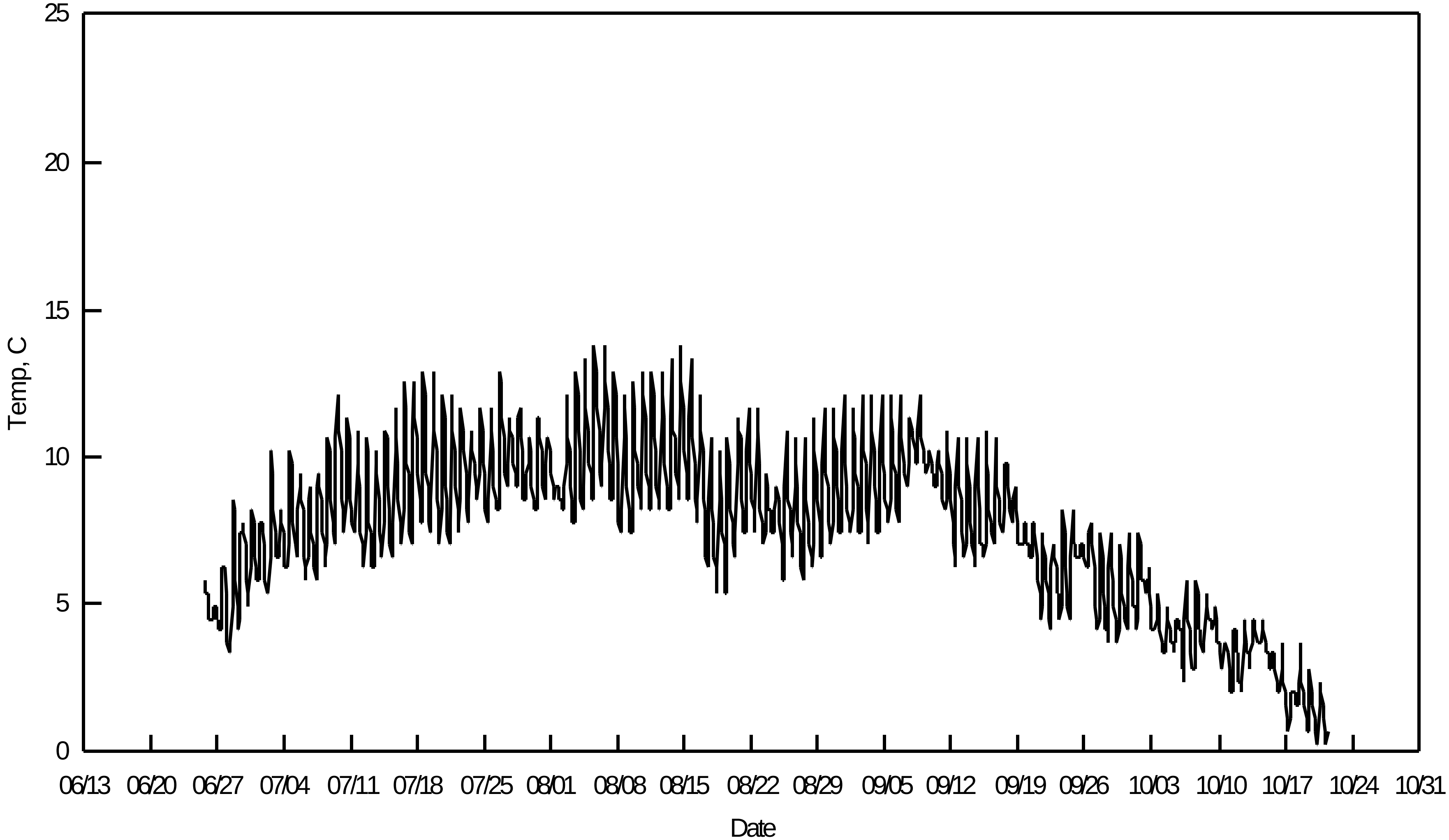

Figure B-35. California Creek Temperature Profile, Summer 1998

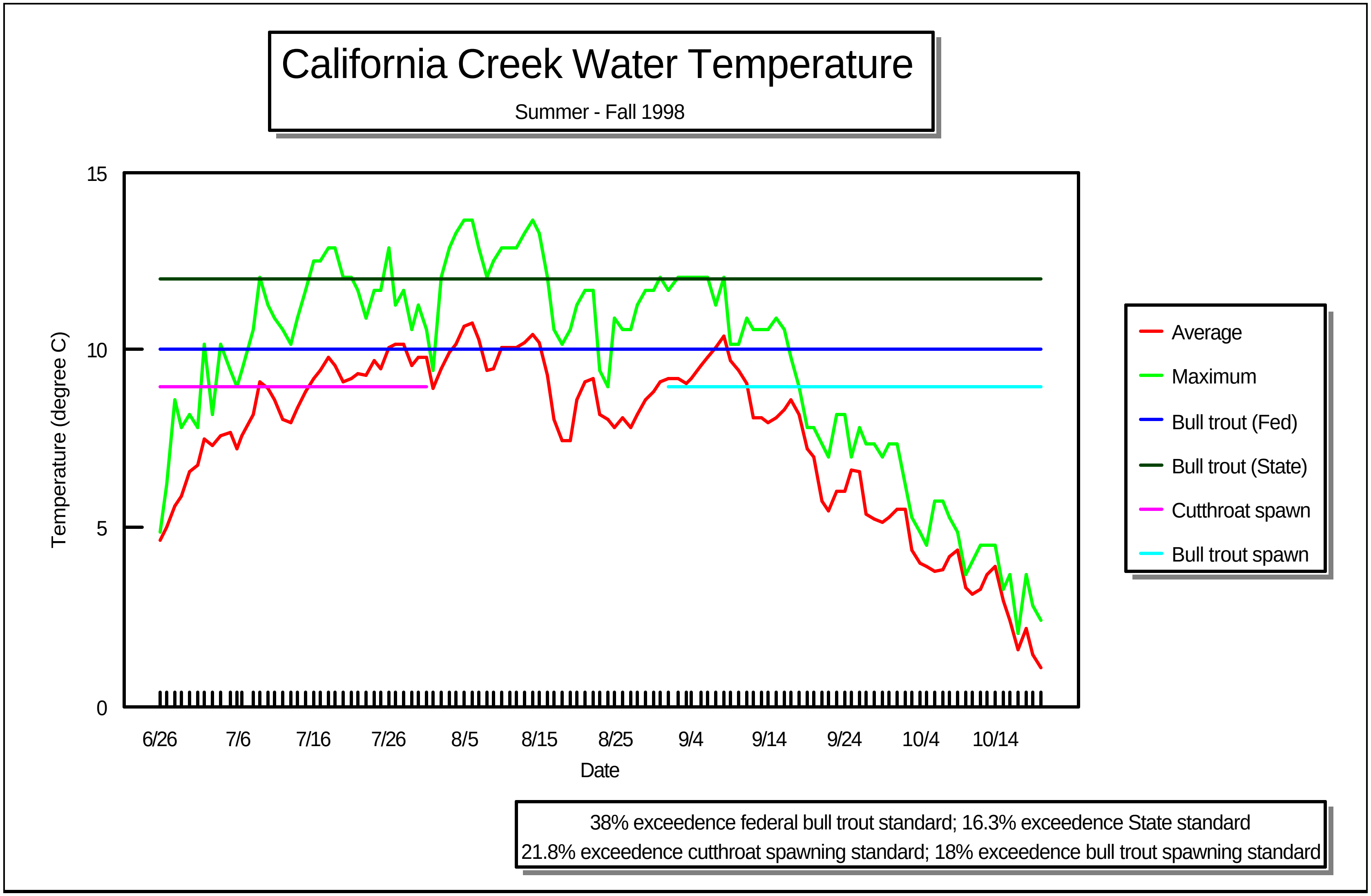

Figure B-36. California Creek Water Temperature Analysis

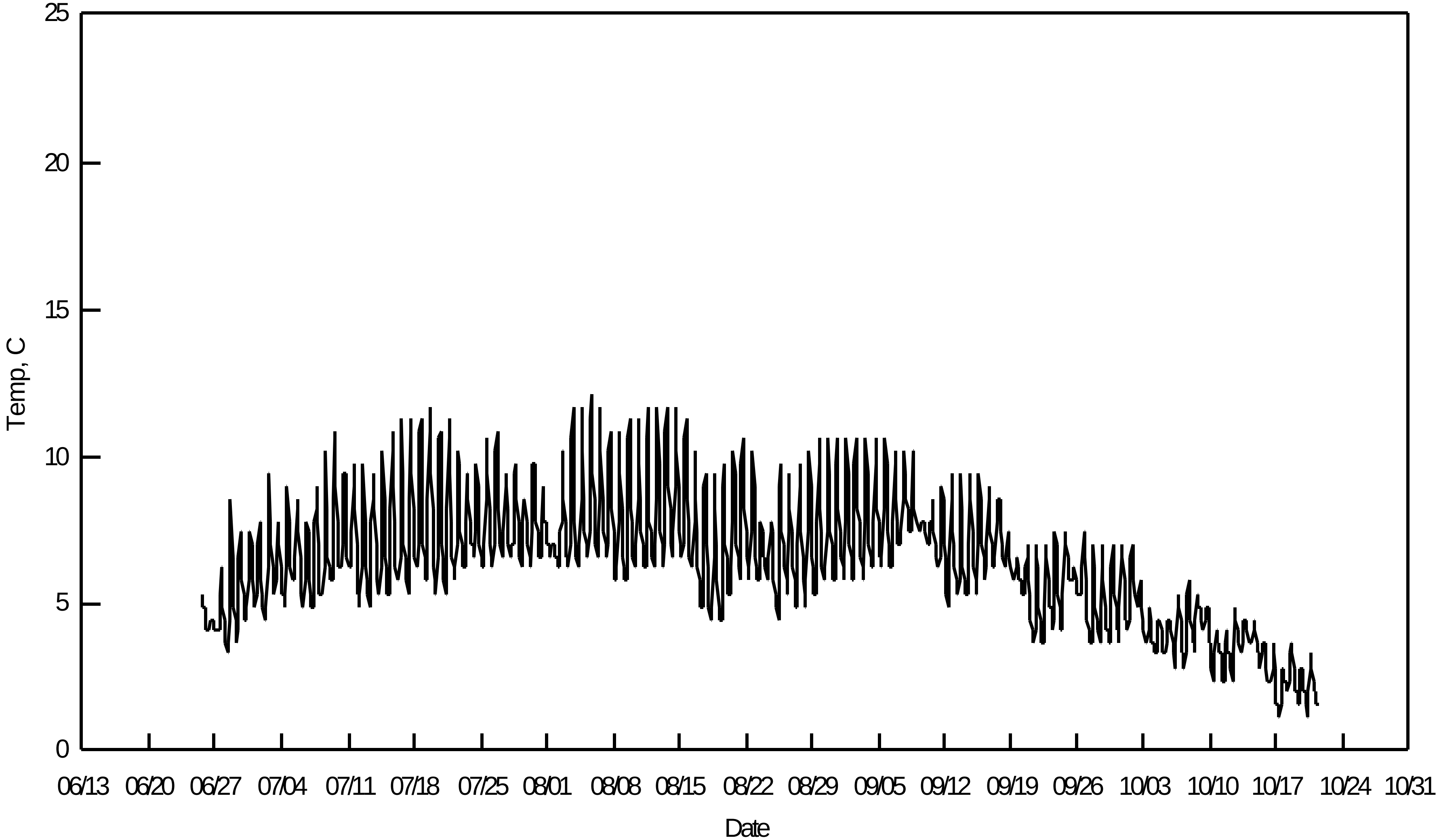

Figure B-37. Medicine Creek Temperature Profile, Summer 1998

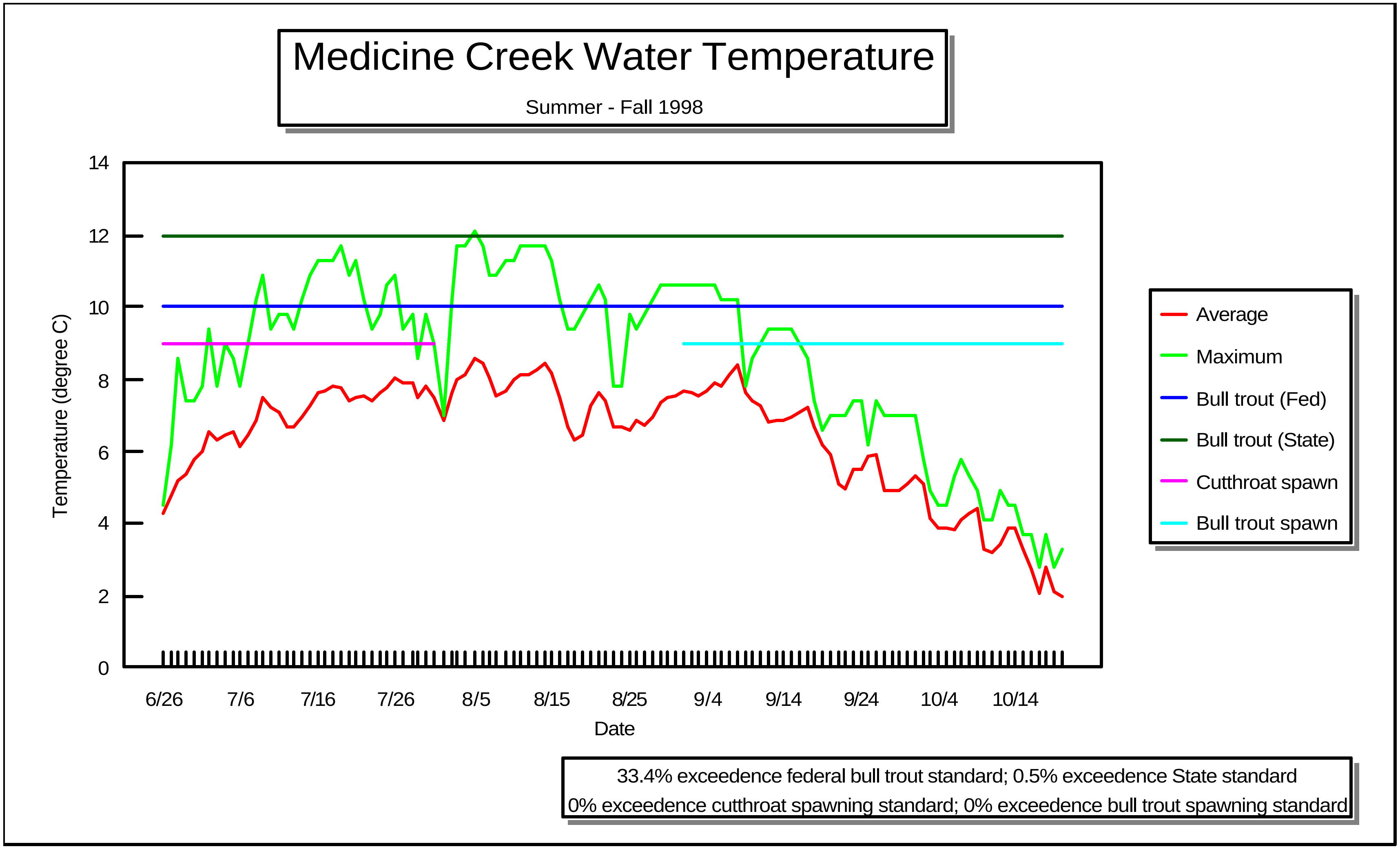

Figure B-38. Medicine Creek Water Temperature Analysis

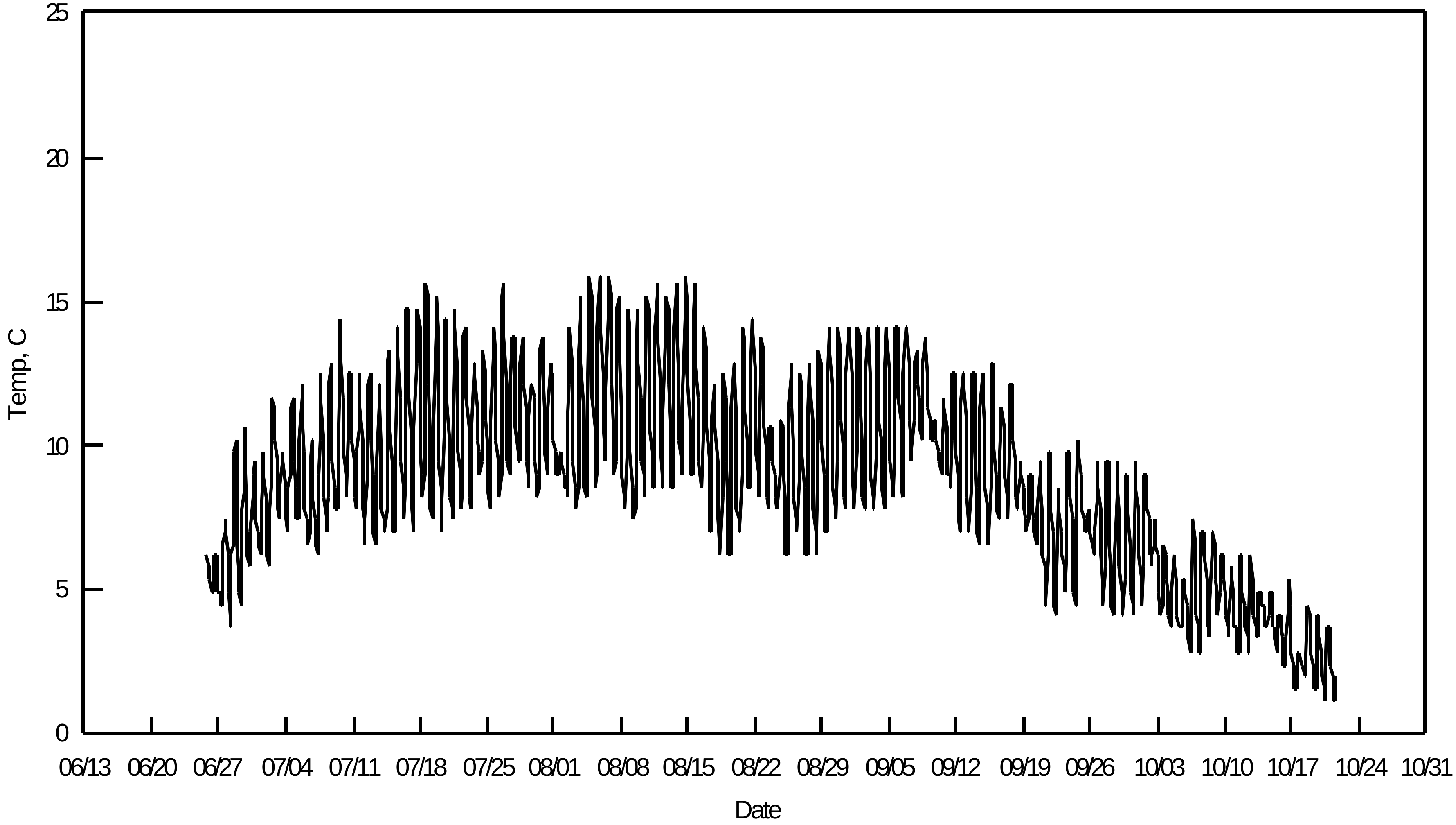

Figure B-39. Upper St. Joe River Temperature Profile, Summer 1998

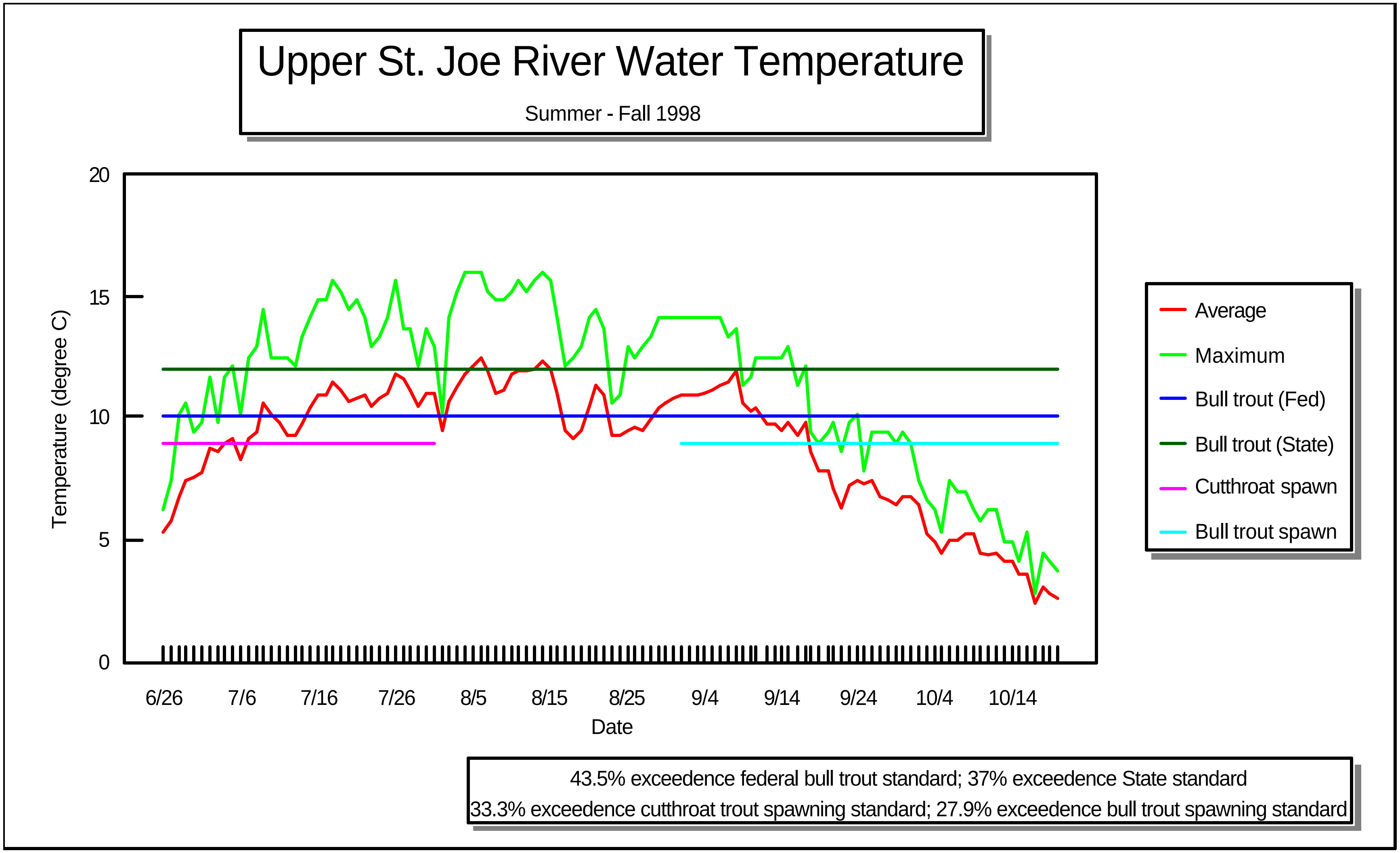

Figure B-40. Upper St. Joe River Water Temperature Analysis

Table B-1. Water quality of the St. Joe River at the Calder Gaging Station.

Sample Date	Temperature, Water (degrees Celsius)	Temperature, Air (degrees Celsius)	Barometric Pressure (millimeters of mercury)	Discharge, Instantaneous (cubic feet per second)	Turbidity (nephelometric turbidity units)	Specific Conductance (microsiemens/ cm at 25^{0} C)
09/04/96	14.7	17.0	706	436	0.30	65
04/27/98	6.2	21.0	717	5,010	0.82	42
05/11/98	7.3	19.5	705	6,360	0.51	34
06/15/98	10.4	16.5	705	2,980	0.42	46
07/08/98						
07/08/98						
07/08/98						
07/08/98						
07/08/98	17.9	30.0	711	1,380	0.22	57
08/10/98	19.7	30.5	714	607	0.22	66
09/14/98	16.0	27.5	710	413		69
10/21/98	7.0	9.00		357		61
11/19/98	5.0	7.50		531		53
12/09/98	2.0	2.50		688		56
01/26/99	0.0	-2.00		1,100		51
02/09/99	1.0	0.00		952		52
03/10/99	2.0	5.00		1,140		54
04/14/99	3.1	5.50	725	2,470	1.10	53
05/10/99	3.9	6.50	709	4,320	1.50	45
06/08/99	6.0	7.50	710	6,990	1.50	34
07/14/99	11.6	17.5	706	2,790	1.60	38
08/10/99	18.7	33.0	705	929	0.32	54
09/09/99	11.1	14.5	708	546	0.42	61

Table B-1, Water quality of the St. Joe River at the Calder Gaging Station, continued.

Sample Date	Oxygen, Dissolved (milligrams per liter)	Oxygen Dissolved (percent saturation)	pH, Water, Whole, Field (standard units)	pH, Water, Whole, Laboratory (standard units)
09/04/96	9.4	10	7.72	7.700
04/27/98	12.4	108	7.05	
05/11/98	12.1	110	7.25	
06/15/98	10.4	103	7.37	
07/08/98				
07/08/98				
07/08/98				
07/08/98				
07/08/98	9.7	111	6.72	
08/10/98	9.6	114	8.02	
09/14/98	14.6	157	7.76	7.680
10/21/98			7.51	
11/19/98			7.90	
12/09/98			7.35	
01/26/99			7.65	
02/09/99			7.36	
03/10/99			6.86	
04/14/99	12.5	100	7.06	
05/10/99	12.3	102	7.57	7.614
06/08/99	11.7		7.44	7.267
07/14/99	10.1	102	7.28	7.348
08/10/99	11.9	139	7.68	7.667
09/09/99	9.4	93	7.45	7.915

Table B-1, Water quality of the St. Joe River at the Calder Gaging Station, continued.

Sample Date	Nitrogen, Nitrite, Dissolved (milligrams per liter as nitrogen)	Nitrogen, Ammonia Plus Organic, Total (milligrams per liter as nitrogen)	Nitrogen, Nitrate Plus Nitrite, Dissolved (milligrams per liter as nitrogen)	Phosphorus, Total (milligrams per liter as phosphorus)	Phosphorus Ortho-Phosphate, Dissolved (milligrams per liter as phosphorus)	Calcium, Dissolved (milligrams per liter as calcium)	Magnesium, Dissolved (milligrams per liter as magnesium)	Potassium, Dissolved (milligrams per liter as potassium)
09/04/96	0.010	0.200	0.050	0.010	0.010	8.200	1.800	0.80
04/27/98	0.010	0.100	0.050	0.010	0.010			
05/11/98	0.010	0.100	0.050	0.010	0.010			
06/15/98	0.010	0.100	0.057	0.019	0.014			
07/08/98								
07/08/98								
07/08/98								
07/08/98								
07/08/98	0.010	0.100	0.050	0.010	0.020			
08/10/98	0.010	0.100	0.050	0.010	0.010			
09/14/98	0.012	0.100	0.050	0.010	0.010	9.185	1.879	0.84
10/21/98		0.100	0.005	0.002	0.001	8.069	1.781	
11/19/98		0.100	0.018	0.004	0.001	6.265	1.428	
12/09/98		0.100	0.005	0.003	0.002	6.526	1.490	
01/26/99			0.010	0.0048	0.003	6.718	1.585	
02/09/99		0.100	0.007	0.0054	0.003	7.197	1.618	
03/10/99		0.100	0.005	0.004	0.002	7.207	1.615	
04/14/99		0.100	0.005	0.007	0.003	6.516	1.468	
05/10/99		0.100	0.005	0.004	0.002	5.441	1.214	
06/08/99		0.109	0.018	0.009	0.004	4.144	0.898	
07/14/99			0.005	0.005	0.002	4.525	0.960	
08/10/99			0.005	0.004	0.002	6.942	1.437	
09/09/99			0.005	0.004	0.002	7.581	1.648	0.72

Table B-1, Water quality of the St. Joe River at the Calder Gaging Station, continued.

Sample Date	Chloride, Dissolved (milligrams per liter as chloride)	Sulfate, Dissolved (milligrams per liter as sulfate)	Fluoride, Dissolved (milligrams per liter as fluoride)	Silica, Dissolved (milligrams per liter as silica)	Cadmium, Dissolved (micrograms per liter as cadmium)	Cadmium, Total (micrograms per liter as cadmium)	Iron, Total (micrograms per liter as iron)	Iron, Dissolved (micrograms per liter as iron)
09/04/96	0.200	1.100	0.1	9.500				
04/27/98								
05/11/98								
06/15/98								
07/08/98								
07/08/98								
07/08/98								
07/08/98								
07/08/98								
08/10/98								
09/14/98	0.346	1.015	0.1	8.774				
10/21/98					1	1.0		
11/19/98					1	1.0		
12/09/98					1	1.0		
01/26/99					1	1.0		
02/09/99					1	1.0		
03/10/99					1	1.0		
04/14/99					1	1.0		
05/10/99	0.199	0.793	0.1	9.310	1	0.1	21.019	10
06/08/99	0.147	0.778	0.1	8.026	1	0.1	145.93	
07/14/99	0.110	0.370	0.1	7.853	1	0.1	47.003	
08/10/99	0.190	0.490	0.1	9.768	1	0.1	25.191	
09/09/99		0.910	0.1	9.569	1	0.1	21.891	

Table B-1, Water quality of the St. Joe River at the Calder Gaging Station, continued.

Sample Date	Lead, Total (micro-grams per liter as lead)	Manganese, Total (micro-grams per liter as manganese)	Manganese, Dissolved (micro-Grams per liter as manganese)	Zinc, Dissolved (micro-grams per liter as zinc)	Zinc, Total (micro-grams per liter as zinc)	Alkalinity, Water, Dissolved, Fixed Endpoint Titration, Lab (milligrams per liter as calcium carbonate)	Fecal Coliform, 0.7 UM-MF (colonies/ 100 milliliters)	Fecal Streptococci, KF Streptococcus MF Method, Water, (colonies/100 milliliters)
09/04/96								
04/27/98								
05/11/98								
06/15/98								35
07/08/98								
07/08/98								
07/08/98								
07/08/98								
07/08/98								
08/10/98								
09/14/98								123
10/21/98	1.0			20.00	10			
11/19/98	1.0			20.00	10			
12/09/98	1.0			20.00	10			
01/26/99	1.0			20.00	10			
02/09/99	1.0			20.00	10			
03/10/99	1.0			20.00	40			
04/14/99	1.0			20.00	40		1	240
05/10/99	0.1	1.872	1.000	1.000	1	23.074	1	
06/08/99	0.1	5.067	1.266	1.168	1	17.824		
07/14/99	0.1	2.318	1.000	2.051	1	18.674		
08/10/99	0.1	2.472	1.485	1.000	1	26.832		
09/09/99	0.1	2.260	1.585	1.000	1	30.868		41

Table B-1, Water quality of the St. Joe River at the Calder Gaging Station, continued.

Sample Date	Mercury, Sediment, Bottom Material < 63U, Wet Sieve, Field, Total (micrograms per gram)	Selenium, Sediment, Bottom Material < 63U, Wet Sieve, Field, Total (micrograms per gram)	Sulfur, Sediment, Bottom Material < 63U, Wet Sieve, Field, Total (percent)	Alkalinity, Water, Dissolved, Total Incremental Titration, Field (milligrams per liter as calcium carbonate)	Aluminum, Biota, Tissue, Dry Weight, Recoverable (micrograms per gram)	Barium, Biota, Tissue, Dry Weight, Recoverable (micrograms per gram)
09/04/96						
04/27/98						
05/11/98						
06/15/98						
07/08/98	0.04	0.24	0.05			
07/08/98						
07/08/98					20.107	0.143
07/08/98					1.486	0.260
07/08/98						
08/10/98						
09/14/98						
10/21/98						
11/19/98						
12/09/98						
01/26/99						
02/09/99						
03/10/99						
04/14/99						
05/10/99				22		
06/08/99						
07/14/99						
08/10/99						
09/09/99						

Table B-1, Water quality of the St. Joe River at the Calder Gaging Station, continued.

Sample Date	Boron, Biota, Tissue, Dry Weight, Recoverable (micrograms per gram)	Chromium, Biota, Tissue, Dry Weight, Recoverable (micrograms per gram)	Copper, Biota, Tissue, Dry Weight, Recoverable (micrograms per gram)	Iron, Biota, Tissue, Dry Weight, Recoverable (micrograms per gram)	Manganese, Biota, Tissue, Dry Weight, Recoverable (micrograms per gram)	Strontium, Biota, Tissue, Dry Weight, Recoverable (micrograms per gram)	Zinc, Biota, Tissue, Dry Weight, Recoverable (micrograms per gram)
09/04/96							
04/27/98							
05/11/98							
06/15/98							
07/08/98							
07/08/98							
07/08/98	0.356	0.557	84.684	1845.6	7.649	0.164	157.45
07/08/98	0.390	0.500	1.510	21.2	1.380	1.210	16.38
07/08/98							
08/10/98							
09/14/98							
10/21/98							
11/19/98							
12/09/98							
01/26/99							
02/09/99							
03/10/99							
04/14/99							
05/10/99							
06/08/99							
07/14/99							
08/10/99							
09/09/99							

Table B-1, Water quality of the St. Joe River at the Calder Gaging Station, continued.

Sample Date	Antimony, Biota, Tissue, Dry Weight, Recoverable (micrograms per gram)	Arsenic, Biota, Tissue, Dry Weight, Recoverable (micrograms per gram)	Beryllium, Biota, Tissue, Dry Weight, Recoverable (micrograms per gram)	Cadmium, Biota, Tissue, Dry Weight, Recoverable (micrograms per gram)	Cobalt, Biota, Tissue, Dry Weight, Recoverable (micrograms per gram)	Lead, Biota, Tissue, Dry Weight, Recoverable (micrograms per gram)
09/04/96						
04/27/98						
05/11/98						
06/15/98						
07/08/98						
07/08/98						
07/08/98	0.22	0.65	0.22	3.79	0.52	3.37
07/08/98	0.18	0.18	0.18	0.18	0.18	0.18
07/08/98						
08/10/98						
09/14/98						
10/21/98						
11/19/98						
12/09/98						
01/26/99						
02/09/99						
03/10/99						
04/14/99						
05/10/99						
06/08/99						
07/14/99						
08/10/99						
09/09/99						

Table B-1, Water quality of the St. Joe River at the Calder Gaging Station, continued.

Sample Date	Molybdenum, Biota, Tissue, Dry Weight, Recoverable (micrograms per gram)	Nickel, Biota, Tissue, Dry Weight Recoverable (micrograms per gram)	Selenium, Biota, Tissue, Dry Weight, Recoverable (micrograms per gram)	Silver, Biota Tissue, Dry Weight, Recoverable (micrograms per gram)	Uranium, Biota, Tissue, Dry Weight, Recoverable (micrograms per gram)	Mercury, Biota Tissue, Dry Weight, Recoverable (micrograms per gram)	Alpha-BHC, D6-, Surrogate, Biota, Whole Organism, Wet Weight, Recoverable (percent)
09/04/96							
04/27/98							
05/11/98							
06/15/98							
07/08/98							
07/08/98							82
07/08/98	1.28	0.22	3.89	0.31	0.22	0.380	
07/08/98	0.18	0.18	0.98	0.18	0.18	0.164	
07/08/98							
08/10/98							
09/14/98							
10/21/98							
11/19/98							
12/09/98							
01/26/99							
02/09/99							
03/10/99							
04/14/99							
05/10/99							
06/08/99							
07/14/99							
08/10/99							
09/09/99							

Table B-1, Water quality of the St. Joe River at the Calder Gaging Station, continued.

Sample Date	Biphenyl, 3,5-Dichloro-Surrogate, Biota, Whole Organism, Wet Weight, Recoverable (percent)	Carbon, Organic + Inorganic, Sediment, Bed Material, Wet Sieved (Nat Wat), Field <63U, Dry Weight, Recoverable (percent)	Carbon, Inorganic, Sediment, Bed Material, Wet Sieved (Nat Wat), Field <63U, Dry Weight, Recoverable (percent)	Water, Present, Biota, Tissue, Dry Weight, Recoverable (percent)	Lipids, Biota, Whole Organism, Wet Weight, Recoverable (percent)	Aldrin, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per kilogram)	PCB, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per kilogram)
09/04/96							
04/27//98							
05/11/98							
06/15/98							
07/08/98		2.37	0.02				
07/08/98	87				3.9	5	50
07/08/98				78.03			
07/08/98				71.23			
07/08/98							
08/10/98							
09/14/98							
10/21/98							
11/19/98							
12/09/98							
01/26/99							
02/09/99							
03/10/99							
04/14/99							
05/10/99							
06/08/99							
07/14/99							
08/10/99							
09/09/99							

Table B-1, Water quality of the St. Joe River at the Calder Gaging Station, continued.

Sample Date	Toxaphene, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)	Pentachloroanisole, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)	Oxychlordane, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)	Trans-Nonachlor, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)	Cis-Nonachlor, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)	Mirex, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)
09/04/96						
04/27//98						
05/11/98						
06/15/98						
07/08/98						
07/08/98	200	5	5	5	5	5
07/08/98						
07/08/98						
07/08/98						
08/10/98						
09/14/98						
10/21/98						
11/19/98						
12/09/98						
01/26/99						
02/09/99						
03/10/99						
04/14/99						
05/10/99						
06/08/99						
07/14/99						
08/10/99						
09/09/99						

Table B-1, Water quality of the St. Joe River at the Calder Gaging Station, continued.

Sample Date	Methoxychlor, P, P'-, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)	Methoxychlor, O, P'-, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)	Lindane, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)	Delta-BHC, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)	Beta-BHC, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)	Alpha-BHC, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)	Benzene, Hexachloro-, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)
09/04/96							
04/27//98							
05/11/98							
06/15/98							
07/08/98							
07/08/98	5	5	5	5	5	5	5
07/08/98							
07/08/98							
07/08/98							
08/10/98							
09/14/98							
10/21/98							
11/19/98							
12/09/98							
01/26/99							
02/09/99							
03/10/99							
04/14/99							
05/10/99							
06/08/99							
07/14/99							
08/10/99							
09/09/99							

Table B-1, Water quality of the St. Joe River at the Calder Gaging Station, continued.

Sample Date	Heptachlor Epoxide, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)	Heptachlor, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)	Endrin, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)	Dieldrin, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)	P,P'-DDE, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)	O,P'-DDE, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)
09/04/96						
04/27//98						
05/11/98						
06/15/98						
07/08/98						
07/08/98	5	5	5	5	10	5
07/08/98						
07/08/98						
07/08/98						
08/10/98						
09/14/98						
10/21/98						
11/19/98						
12/09/98						
01/26/99						
02/09/99						
03/10/99						
04/14/99						
05/10/99						
06/08/99						
07/14/99						
08/10/99						
09/09/99						

Table B-1, Water quality of the St. Joe River at the Calder Gaging Station, continued.

Sample Date	O,P'-DDD, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)	P,P'-DDD, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)	P,P'-DDT, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)	O,P'-DDT, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)	DCPA, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)	Trans-Chlordane, Biota, Whole Organism, Wet Weight, Recoverable (micrograms per gram)
09/04/96						
04/27//98						
05/11/98						
06/15/98						
07/08/98						
07/08/98	5	5	5	5	5	5
07/08/98						
07/08/98						
07/08/98						
08/10/98						
09/14/98						
10/21/98						
11/19/98						
12/09/98						
01/26/99						
02/09/99						
03/10/99						
04/04/99						
05/10/99						
06/08/99						
07/14/99						
08/10/99						
09/09/99						

Table B-1, Water quality of the St. Joe River at the Calder Gaging Station, continued.

Sample Date	Cis-Chlordane Biota, Whole Organism, Wet (micrograms per gram)	Vanadium, Biota, Tissue, Dry (micrograms per gram)	Solids, Residue on Evaporation at 180?C, Dissolved (milligrams per liter)	Sediment, Suspended Sieve, Diameter, (percent finer than 0.062 millimeters)	Sediment, Suspended Concentration (milligrams per liter)	Specific Conductance (microsiemens per centimeter at 25?C)
09/04/96			58		2	67.0
04/27//98				100	3	42.2
05/11/98				100	5	34.9
06/15/98				100	2	46.8
07/08/98						
07/08/98	5					
07/08/98		0.41				
07/08/98		0.18				
07/08/98					2	57.4
08/10/98					1	67.6
09/14/98					1	70.1
10/21/98						
11/19/98						
12/09/98						
01/26/99						
02/09/99						
03/10/99						
04/04/99					1	54.2
05/10/99				100	1	46.4
06/08/99					8	35.1
07/14/99				100	2	38.3
08/10/99				100	1	53.7
09/09/99					1	61.6

Table B-2. United States Geological Survey water column data for the St. Joe River at the city of St. Maries.

Sample Date	Temperature, Water (degrees Celsius)	Temperature, Air (degrees Celsius)	Discharge, Instantaneous (cubic feet per second)
03/12/90			
01/04/91	0.0	-2.5	1,310
01/23/91	0.0	3.0	2,410
02/11/91	1.0	3.0	3,900
02/25/91	5.0	12.0	6,870
03/19/91	8.0	18.0	2,970
03/26/91	4.0	4.0	3,000
04/02/91	7.5	10.0	3,280
04/03/91			
04/09/91	5.0	9.0	8,080
04/16/91	7.0	10.0	5,480
04/23/91	7.0	9.0	9,360
04/23/91			
04/29/91			
04/29/91	6.5	12.5	6,370
05/07/91	9.0	16.0	6,770
05/14/91	7.0	11.0	11,800
05/21/91	9.0	12.0	17,200
05/29/91	9.0	16.0	8,880
06/03/91	10.5	10.0	9,340
06/19/91	10.0	16.0	5,250
07/11/91	18.0	17.0	2,910
07/30/91	26.0	26.0	1,270
08/19/91	25.5	25.5	1,030
09/10/91	18.0	19.0	703
10/01/91	16.0	20.0	472
10/18/91	14.0	2.0	663
10/30/91	5.5	-0.5	322
11/14/91	6.0	9.0	861
11/26/91	4.0	4.0	1,540
12/12/91	3.5	6.0	975
01/07/92	1.0	2.0	690
02/04/92	4.5	6.5	2,870
02/20/92	4.5	7.5	5,480
03/06/92	8.0	17.0	4,620

Table B-2, United States Geological Survey water column data for the St. Joe River at the city of St. Maries, continued.

Sample Date	Temperature, Water (degrees Celsius)	Temperature, Air (degrees Celsius)	Discharge, Instantaneous (cubic feet per second)
03/12/92	6.0	17.0	3,280
03/19/92	7.0	12.5	4,250
03/26/92	7.5	8.0	3,080
04/10/92	5.5	11.0	3,230
04/17/92	9.0	9.5	4,690
04/23/92	6.5	7.5	4,970
04/30/92	8.0	9.5	5,990
05/05/92	11.0	23.5	5,650
05/12/92	9.5	11.5	4,190
05/27/92	14.5	11.5	3,390
06/09/92	19.5	23.5	1,320
06/23/92	22.0	26.0	1,090
07/07/92	19.0	15.0	561
07/21/92	24.5	17.0	695
08/04/92	24.0	28.5	548
08/18/92	25.0	34.0	350
09/09/92	16.5	9.0	673
10/06/92			
10/21/92	8.5	11.0	567
11/18/92	4.5	6.0	1,000
12/10/92	1.0	2.0	769

Table B-2, United States Geological Survey water column data for the St. Joe River at the City of St. Maries, continued.

Sample Date	Specific Conductance (microsiemens per centimeter at 25?C)	Nitrogen, Ammonia, Total (milligrams per liter as nitrogen)	Nitrogen, Nitrite Total (milligrams per liter as nitrogen)	Nitrogen, Ammonia Plus Organic, Total (milligrams per liter as nitrogen)	Nitrogen, Nitrite Plus Nitrate, Total (milligrams per liter as nitrogen)	Phosphorus, Total (milligrams per liter as phosphorus)
03/12/90		0.015	0.006	0.2	0.008	0.007
01/04/91	61	0.014	0.002	0.2	0.078	0.004
01/23/91	52	0.015	0.005	0.2	0.037	0.040
02/11/91	57	0.015	0.009	0.2	0.025	0.007
02/25/91	46	0.029	0.006	0.2	0.029	0.001
03/19/91	49	0.030	0.003	0.3	0.101	0.010
03/26/91	49	0.013	0.001	0.2	0.038	0.001
04/02/91	51	0.016	0.011	0.2	0.016	0.005
04/03/91		0.025	0.014	0.2	0.079	0.005
04/09/91	42	0.017	0.005	0.2	0.030	0.007
04/16/91	46	0.019	0.014	0.2	0.021	0.006
04/23/91	40	0.019	0.011	0.2	0.036	0.007
04/23/91		0.019	0.007	0.2	0.060	0.004
04/29/91		0.028	0.006	0.4	0.035	0.006
04/29/91	43	0.017	0.004	0.2	0.008	0.002
05/07/91	46	0.032	0.001	0.2	0.601	0.001
05/14/91	34	0.022	0.003	0.5	0.022	0.011
05/21/91	34	0.014	0.001	2.5	0.026	0.077
05/29/91	31	0.057	0.001	0.4	0.103	0.016
06/03/91	36	0.015	0.002	0.2	0.014	0.019
06/19/91	39	0.009	0.002	0.3	0.005	0.017
07/11/91	40	0.030	0.002	0.2	0.078	0.011
07/30/91	48	0.008	0.004		0.005	0.008
08/19/91	52	0.039	0.003	0.2	0.011	0.009
09/10/91	67	0.010	0.002	0.2	0.005	0.013
10/01/91	52	0.013	0.003	0.2	0.005	0.009
10/18/91	52	0.031	0.008	0.2	0.010	0.013
10/30/91	65	0.027	0.009	0.2	0.013	0.010
11/14/91		0.026	0.004	0.2	0.009	0.01
11/26/91	51	0.019	0.011	0.2	0.018	0.025
12/12/91	51			0.2		
01/07/92	57	0.019		0.2	0.013	0.010
02/04/92	41	0.017	0.008	0.2	0.017	0.016
02/20/92	42	0.042	0.027	0.3	0.031	0.101

Table B-2, United States Geological Survey water column data for the St. Joe River at the city of St. Maries, continued.

Sample Date	Specific Conductance (microsiemens per centimeter at 25?C)	Nitrogen, Ammonia, Total (milligrams per liter as nitrogen)	Nitrogen, Nitrite, Total (milligrams per liter as nitrogen)	Nitrogen, Ammonia Plus Organic, Total (milligrams per liter as nitrogen)	Nitrogen, Nitrite Plus Nitrate, Total (milligrams per liter as nitrogen)	Phosphorus, Total (milligrams per liter as phosphorus)
03/03/92	43	0.014	0.007	0.2	0.010	0.002
03/12/92	35					
03/19/92	42	0.015	0.008	0.2	0.032	0.009
03/26/92	53	0.014	0.022	0.2	0.027	0.011
04/10/92	31	0.024	0.007	0.2	0.009	0.007
04/17/92	65	0.018	0.004	0.2	0.006	0.009
04/23/92	40	0.002	0.003	0.2	0.013	0.005
04/30/92	39	0.007	0.001	0.2	0.013	0.008
05/05/92	37	0.006	0.001	0.2	0.009	0.009
05/12/92	35	0.002	0.002	0.2	0.009	0.004
05/27/92	48	0.013	0.006	0.2	0.047	0.015
06/09/92	47	0.033	0.003	0.2	0.005	0.003
06/23/92	55	0.006	0.001	0.2	0.005	0.007
07/07/92	58	0.004	0.003	0.2	0.005	0.006
07/21/92	63	0.011	0.001	0.2	0.005	0.010
08/04/92	75	0.006	0.001	0.2	0.019	0.012
08/18/92	71	0.018	0.001	0.2	0.015	0.003
09/09/92	68	0.017	0.002	0.2	0.005	0.006
10/06/92		0.028	0.013	0.2	0.082	0.007
10/21/92	70	0.025	0.008	0.2	0.010	0.009
11/18/92	62	0.021	0.010	0.2	0.014	0.007
12/10/92	67	0.011	0.001	0.2	0.032	0.008

Table B-2, United States Geological Survey water column data for the St. Joe River at the city of St. Maries, continued.

Sample Date	Arsenic, Total (micrograms per liter as arsenic)	Cadmium, Total (micrograms per liter as cadmium)	Copper, Total (micrograms per liter as copper)	Lead, Total (micrograms per liter as lead)	Zinc, Total (micro-grams per liter as zinc)	Phosphorus, Ortho-phosphate, Total (milligrams per liter as phosphorus)
03/12/90						0.003
01/04/91	1	1	7	6	10	0.002
01/23/91	1	1	5	3	10	0.008
02/11/91	1	1	14	8	10	0.002
02/25/91	1	1	13	5	10	0.001
03/19/91	1	1	4	5	20	0.004
03/26/91	1	1	2	5	20	0.001
04/02/91	1	1	4	3	10	
04/03/91	1	1	9	9	110	
04/09/91	1	1	6	47	10	0.003
04/16/91	1	1	8	8	20	
04/23/91	1	1	4	7	10	0.007
04/23/91	1	1	3	9	90	
04/29/91	1	1	6	13		0.005
04/29/91	1	1	12	4		
05/07/91	1	1	9	9	90	
05/14/91	1	1	9	15	20	0.007
05/21/91	1	1	2	76	10	0.002
05/29/91	1	1	6	4	40	0.001
06/03/91	1	1	8	5	10	0.004
06/19/91	1	1	6	6	10	0.001
07/11/91	1	1	4	15	10	0.001
07/30/91	1	1			10	0.003
08/19/91	1	2		10	20	0.001
09/10/91	1	1	8	5	20	0.005
10/01/91	1	4	6	8	10	0.001
10/18/91	1			17		0.004
10/30/91	1	1	4	8	30	0.004
11/14/91	2					0.004
11/26/91	1	10		3	100	0.009
12/12/91	1	10		8	180	
01/07/92	1	6	5	1	50	0.013
02/04/92	1	1	12	9	10	0.008
02/20/92	1	1	11	6	20	0.039
03/03/92	1	1	5	1	10	0.005

Table B-2, United States Geological Survey water column data for the St. Joe River at the city of St. Maries, continued.

Sample Date	Arsenic, Total (micrograms per liter as arsenic)	Cadmium, Total (micrograms per liter as cadmium)	Copper, Total (micrograms per liter as copper)	Lead, Total (micrograms per liter as zinc)	Zinc, Total (micro-grams per liter as zinc)	Phosphorus, Ortho-phosphate, Total (milligrams per liter as phosphorus)
03/12/92	1	1	6	2	10	
03/19/92	1	1	3	2	10	0.009
03/26/92	1	1	8	2	10	0.006
04/10/92	1	1	4	2	20	0.005
04/17/92	1	2	13	45	340	0.004
04/23/92	1	1	2	2	10	0.004
04/30/92	1	1	2	6	80	0.002
05/05/92	1	1	3	3	10	0.004
05/12/92	1	1	2	2	10	0.002
05/27/92	1	1	2	1	10	0.002
06/09/92	1	1	4	1	10	0.001
06/23/92	1	1	6	2	10	0.001
07/07/92	1	1	2	5	60	0.001
07/21/92	1	1	4	3	10	0.003
08/04/92	1	1	6	5	30	0.005
08/18/92	2	1	6	16	30	0.001
09/09/92	1	1	4	4	30	0.001
10/06/92	1	1	4	2	30	0.001
10/21/92	1	1	7	3	20	0.001
11/18/92	1	1	2	1	10	0.006
12/10/92	1	1	5	3	20	0.007

Appendix C

Sediment Model Assumptions and Documentation

Appendix C. Sediment Model Assumptions and Documentation

Background:

In the Panhandle Region, sediment is the pollutant of concern in the majority of water quality limited streams. The lithology or terrain of the region most often governs the form the sediment takes. Two major types of terrain dominate in northern Idaho. These are the meta-sedimentary Belt Supergroup and granitics present either in the Kaniksu batholith or in smaller intrusions such as the Round Top Pluton and the Gem Stocks. In some locations Columbia River Basalt formations are important, but these tend to be to the south and west; primarily on the Coeur d'Alene Reservation. Granitics mainly weather to sandy materials, but also weather to pebbles or larger-sized particles. Pebbles and larger particles with significant amounts of sand remain in the higher gradient stream bedload. The Belt terrain produces silt size particles, pebbles, and larger particles. Silt particles are transported to low gradient reaches, while the larger particles comprise the majority of the higher gradient stream bedload. Basalts erode to silt and particles similar in size to the Belt terrain. Large basalt particles are less resistant and weather to smaller particles.

Any attempt to model the sediment output of watersheds will provide relative, rather than exact, sediment yields. The model documented here attempts to account for all significant sources of sediment separately. This approach is used to identify the primary sources of sediment in a watershed. Identification will be useful as implementation plans designed to remedy these sources are developed. If additional investigation indicates that sources quantified as minor are not, the model input can be altered to incorporate this new information.

Model Assumptions:

Land use and sediment delivery:

Revised Universal Soil Loss Equation (RUSLE) is the correct model for pasture land as it accounts for production and delivery of fine-grained sediment.

Sediment yield coefficients measured in-stream on geologies of northern and north central Idaho cover production and delivery of sediment from forested areas. These sediment yield coefficients reflect both fine and coarse sediment.

Sparse and heavy forests of all age classes, including the seedling-sapling age class, should be given mid range of the sediment yield coefficient for the geologies. Areas not fully stocked by Forest Practices Act standards should be given the upper end of the range.

Sediment yield coefficients can be modified within the range observed to estimate highway corridor land use and the effects of repeated wild fires.

Double burned areas have eroded significantly to the stream channel but are not now eroding; a residual sediment load in the channels is possible from previous catastrophic burns.

Erosion from stream bank lateral recession can be estimated with the direct volume method (Erosion and Sediment Yield in Channels Workshop 1983).

Road sediment production and delivery:

Road erosion using the Cumulative Watershed Effects (CWE) approach should be limited to 200 feet of road on either side of road crossings, not tied to total road mileage.

The use of the McGreer relationship between the CWE score and road surface erosion is a valid estimate of road surface fines production and yield. In the case of Belt terrain, it is a conservative estimate (overestimate).

The CWE data collected for actual road fill failures and sediment delivery reflect the situation throughout the watershed. Since the great majority of road failures occur during episodic high discharge events with a 10- to 15- year return period, road failures reflect the actions of the last large event and must be divided by ten for an annualized estimate.

Fines and coarse loading can be estimated for stream reaches where roads encroach on the stream using estimated erosion rates on defined model cross-sections. Erosion resulting from encroachment occurs primarily during episodic high discharge events with a 10- to15- year return period, therefore, road encroachment erosion must be divided by ten for an annualized estimate.

Failing road fill and eroding bank material are composed of fines and coarse material. The proportions of fines and coarse material can be estimated from the soil series descriptions of the watershed.

Sediment Delivery:

100% delivery from forestlands with sediment yield coefficients measured in-stream on geologies of northern and north central Idaho.

100% delivery from agricultural lands estimated with RUSLE

100% delivery from all road miles up to 200 feet from a stream crossing as estimated by the McGreer relationship

Fines and coarse materials are delivered at the same rate from fill failures and from erosion resulting from road encroachment and bank erosion.

Model Approach:

The sediment model attempts to account for all sources of sediment by partitioning these sources into broad categories.

Land use is the primary broad category. It is treated separate from other characteristics such as stream bank erosion and roads. Land use types are divided into agriculture, forest, urban, and highways.

Agriculture may be subdivided into working farms or ranches and small ranchettes, which currently exist on subdivided agriculture land. Sediment yields from agricultural lands that receive any tillage, even on an infrequent basis, are modeled with RUSLE. Sediment yields were estimated from agricultural lands (rangeland, pasture and dry agriculture) using RUSLE (equation 1)(Hogan 1998).

Equation 1: A = (R)(K)(LS)(C)(D) tons per acre per year where:

: A is the average annual soil loss from sheet and till erosion
: R is climate erosivity
: K is the soil erodibility
: LS is the slope length and steepness
: C is the cover management
: D is the support practices

The RUSLE does not take into account stream bank erosion, gully erosion, or scour erosion. The RUSLE applies to cropland, pasture, hayland, or other land that has some vegetation improvement by tilling or seeding. Based on the soils, the characteristics of the agriculture, and the slope, sediment yields were developed for the agricultural lands of each watershed. The RUSLE develops values that reflect the amount of sediment eroded and delivered to the active channel of the stream system annually.

Forestlands and some land in highway rights of way are modeled using the mean sediment export coefficients measured in-stream on geologies of northern and north central Idaho (USFS 1994). The values developed by these sediment yield coefficients are equal to the amount of sediment eroded and the amount of sediment delivered to the stream courses annually. Forestlands that are fully stocked with trees are treated with the median coefficient for sediment yields ascribed to that terrain. Lands not fully stocked by Idaho Forest Practices Act standards are assigned the highest coefficient of the range. Paved road rights of way are assigned the lowest coefficient of the range. Areas that were burned by two large wild fires, as delineated in the IPFIRES model, are adjusted by a coefficient that is the difference between the highest value of the coefficient for the geologic type and the median.

All coefficients are expressed as tons per acre per year and are applied to the acreage of each land type developed from Geographical Information System (GIS) coverages. All land uses are displayed with estimated sediment delivery. Land use sediment delivery is totaled.

Roads are treated separately by the model. Forest haul roads are differentiated from county and private residential roads. County roads often have larger stream passage structures and are normally much wider and have gravel or pavement surfacing. Private residential roads are often limited in length, but can have poor stream crossing structures. Sediment yields from county and private roads are modeled using a newer RUSLE model (Sandlund 1999). Road relief, slope length, surfacing, soil material, and width are the most critical factors. The sediment yield was applied only to 200 feet on either side of stream crossings. Failure of county and private road fills was assumed nonexistent because such roads are often on gentle terrain. Consequently, road fill failures are rare.

Forest roads were modeled using data developed with the cumulative watershed effects (CWE) protocol. A watershed CWE score was used to estimate surface erosion from the road surface. Forest road sediment yield was estimated using the relationship between the CWE score and the sediment yield per mile of road (Figure 1). The relationship was developed for roads on a Kaniksu granitic terrain in the LaClerc Creek watershed (McGreer 1998). Its application to roads on Belt terrain conservatively estimate sediment yields from these systems. The watershed CWE score was used to develop sediment tons per mile, which was multiplied by the estimated road mileage affecting the streams. It was assumed that all sediment was delivered to the stream system. This is a conservative estimate of actual delivery.

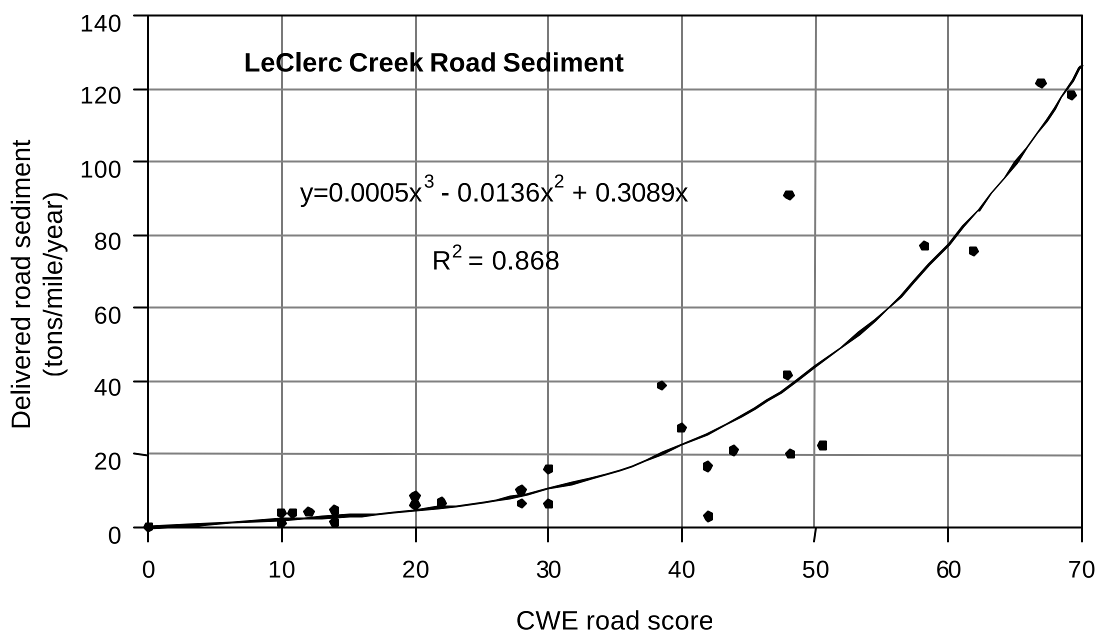

Figure C-1. Sediment Export of Roads Based on Cumulative Watershed Effects Scores

Forest road failure was estimated from actual CWE road fill failure and delivery data. These failures were interpreted as the primary result of large discharge events, which occur on a 10 – 15 year return period (McClelland *et al.* 1997). The estimates were annualized, by dividing the measured values by 10. Data are typically from a subset of the roads in a watershed. The sediment delivery value was scaled using a factor reflecting the watershed road mileage divided by the road mileage assessed. The sediments delivered through this mechanism contained both fine material (including, and smaller than, pebbles) and coarse material (pebbles and larger sizes). The percentages of fine and coarse particles were estimated using the described characteristics of the soil series found in the watershed. The weighted average of the fines and coarse composition of the B and C soil horizons to a depth of 36 inches were developed using the soils GIS coverage STATSGO, which contains the soils composition data provided by soils survey documents. The B and C horizons' composition was used because these are the strata from which forest roads are normally constructed. Based on the developed soil composition percentage and the estimated probable yield, the tons of fine and coarse material delivered to the streams by fill failure was calculated. This approach assumes equal delivery of fine and coarse materials.

Roads cause stream sedimentation by an additional mechanism. The presence of roads in the floodplain of a stream most often interferes with the stream's natural tendency to seek a steady state gradient. During high discharge periods, the constrained stream often erodes at the roadbed, or, if the bed is armored, erodes at the opposite bank or its bed. The erosion resulting from a road- imposed gradient change results in stream sedimentation. The model assumes the roads causing gradient effects to be those within 50 feet of the stream. The model then assumes 0.25-inch erosion per lineal foot of bed and bank up to three feet in height. The 0.25- inch cross-section erosion is assumed to be uniform over the bed and banks. The erosion rate was selected from a model curve of erosion in inches compared to modeled sediment yields from a channel 10 feet in width. The stream cross-section used was based on the weighted bank full width for all measurements made of streams in the Beneficial Use Reconnaissance and Use Attainability programs. The erosion is determined from the soil types in the basin with the weighted percentages of fine and coarse material. A bulk soil density of 2.6 grams per cubic centimeter is used to convert soil volume into weight in tons. The tons of fine and coarse material are totaled for all road segments within 50 lineal feet of the stream. The bulk of this erosion is assumed to occur during large discharge events which occur on a 10 - 15-year return period (McClelland *et. al* 1997). The estimates, therefore, are annualized by dividing the measured values by 10.

Estimates of bank recession are appropriate primarily along low gradient Rosgen B and C channels Rosgen 1985). The direct volume method, as discussed in the Erosion and Sediment Yield Channel Evaluation Workshop (1983), was employed to make the estimates. The method relies on measurements of eroding bank length, lateral recession rate, soil type, and particle size to make these estimates. A field crew collected these data. The fine and coarse material fractions of the bank material based on STATSGO GIS coverage are used to estimate fine and coarse material delivery to the stream. These values are added into the watershed sediment load.

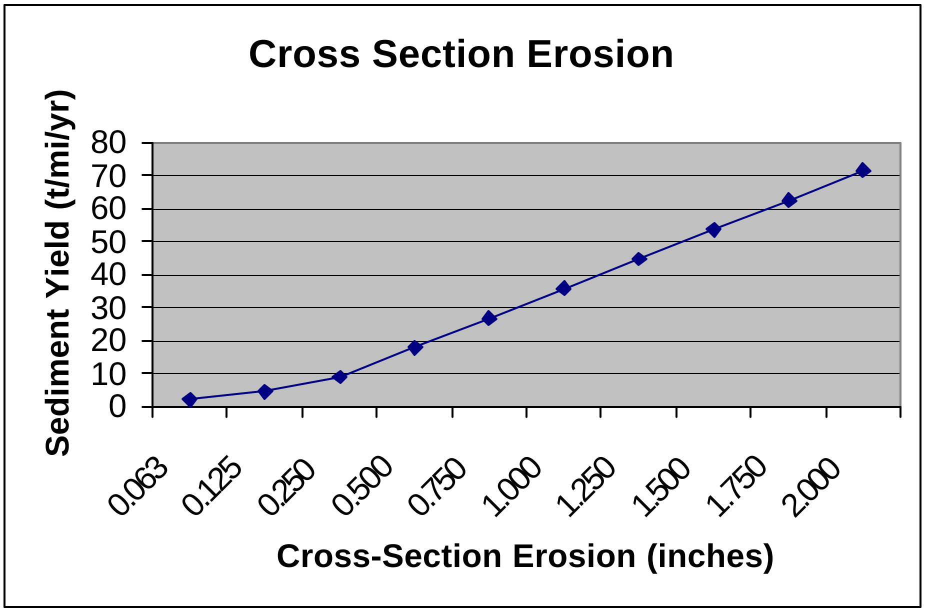

Figure C-2. Modeled Sediment Yield From Thickness of Cross-Section Erosion

The model does not consider sediment routing, nor does it attempt to estimate the erosion to streambeds and banks resulting from localized sediment deposition in the streambed. The model does not attempt to measure the effects of additional water capture at road crossings. It is assumed, that on the balance, the additional stream power created by additional water capture over a shorter period would increase net export of sediment, even though some erosion would be caused by this watershed effect.

Model Operation:

The model is an Excel workbook composed of four spreadsheets. Key data, such as acreages and percentages, are entered into sheets one and two of the model. The total estimated sediment from the varied sources is calculated in spreadsheet three. County and private road data are supplied in sheet four.

Assessment of Model's Conservative Estimate:

Several conservative assumptions were made in the model construction, which cause it to develop conservatively high estimations of sedimentation in the streams modeled. These assumptions are listed in the following paragraphs and a numerical assessment of the magnitude of the conservatism is assigned.

The model uses RUSLE and forest sediment yield coefficients to develop land use sediment delivery estimates. The output values are treated as delivery to the stream. The RUSLE assumes delivery if the slope assessed is immediately up gradient from the stream system. This is not the case on the majority of the agricultural land assessed. Estimates made in the Lake Creek Sediment Study indicate that, at most, 25% of the erosion modeled was delivered as sediment to the stream (Bauer, Golden, and Pettit 1998). A similar local estimate has not been made with sediment yield coefficients, but it is likely that this estimate would be 25% as well. The land use model component is 75% conservative.

The roads crossing component of the model assumes 100% delivery of fine sediment from the 200 feet on either side of a stream crossing. It is more likely that some fine sediment remains in ditches. A reasonable level of delivery is 80%. The model is likely 20% conservative in this component. On Belt terrain, use of the McGreer model is conservative. Since the sediment yield coefficients measured in-stream for Kaniksu granites are 167% of the coefficient for Belt terrain, this factor is estimated to be 67% conservative.

Road encroachment is defined as the existence of a road within 50 feet from the stream, primarily because this is near the resolution of commonly used GIS mapping techniques. A road 50 feet from a stream, but on a side hill, would not affect the stream gradient. The model is likely incorrect on encroachment 20% of the time and is conservative by this factor.

Fill failure data is developed from actual CWE field assessments. The CWE assessment does not assess all the roads in the watershed. The failure rate data is scaled up by the factor of the roads assessed divided into the actual watershed road mileage. The roads assessed are typically those remote from the stream system, which are very unlikely to deliver sediment to the stream. The percentage of watershed roads assessed varies, but it is commonly 60% or less of the watershed roads. The model is 40% conservative in this component. Table C-1 summarizes the conservative assumptions and assesses its numerical level of overestimation.

Table C-1. Conservative estimate of stream sedimentation provided by the sediment model.

Model Factor	**Kaniksu Granites (% conservative)**	**Belt Supergroup (% conservative)**
100% RUSLE and forest land sediment yield delivery	75%	75%
Crossing delivery	29%	20%
McGreer model	0%	67%
Road encroachment at 50 feet	20%	20%
Road failure	40%	40%
Total assessment of overestimate	164%	231%

The model provides an overestimate by factors of 1.6 and 2.3 for the Kaniksu and Belt terrain, respectively. This overestimation is a built-in margin of safety of 231% for the South Fork Coeur d’Alene River.

Model Verification:

Some verification of the model can be developed by comparing measured sediment loads with those predicted by the model. For example, the United States Geological Survey measured sediment load at the Enaville Station on the Coeur d'Alene River during water year 1999. Based on these measured estimates, the sediment load per square mile of the basin above this point was calculated to be 28 tons (URS Greiner 2001). The middle value of the Belt geology sediment yield coefficient range is 14.7 tons per square mile. The model outputs for several watersheds of the North Fork Coeur d'Alene River are provided in Table C-2. The model predicted a sediment yield of 33.6 tons/year for the entire subbasin. The agreement between the measured estimates and the modeled estimates is good.

Table C-2. Modeled sediment output from selected North Fork Coeur d'Alene River watersheds.

Watershed	Square miles	Modeled sediment	Tons/square mile
Deer	10.0	153.1	15.3
Alden	7.9	158.5	20.1
Independence	59.5	1,156.1	19.4
Trail	25.2	976.1	38.7
Flat	17.6	711.9	40.5
Prichard	53.6	1,636.5	30.6
Burnt Cabin	28.8	1,325.7	46.0
Skookum	7.1	191.2	26.9
Bumblebee	24.9	901.2	36.2
Streamboat	41.4	1,955.3	47.2
Graham	9.3	138.4	14.9
Little North Fork	169.0	6,769.2	40.1
North Fork Total[1]	903.2	30.369.7	33.6

[1]Total includes watersheds not listed above.

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Appendix D

Graphic Representation of Road Mileage

Appendix D. Graphic Representation of Road Mileage

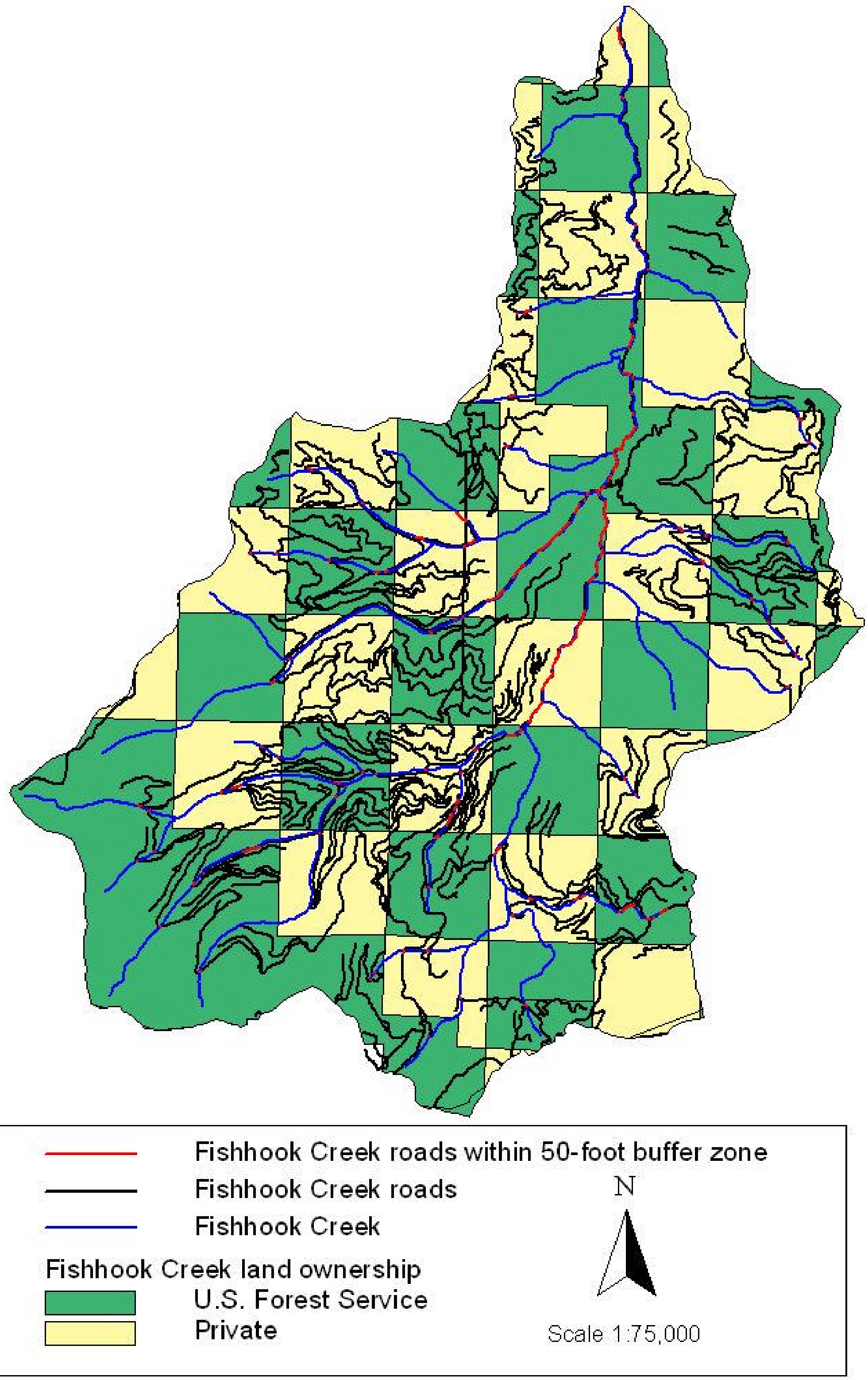

Figure D-1. Fishhook Creek Road Mileage

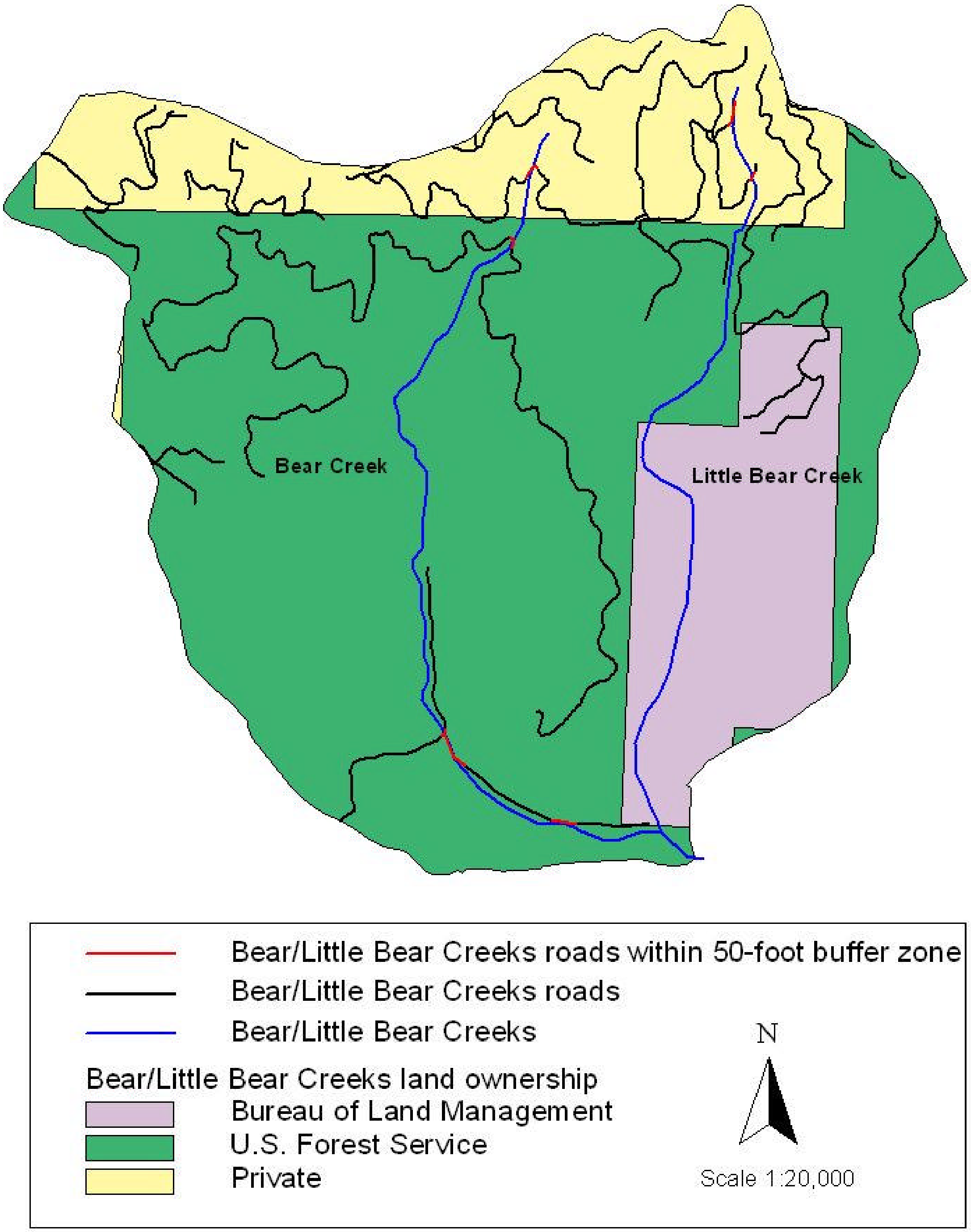

Figure D-2. Bear/Little Bear Creeks Road Mileage

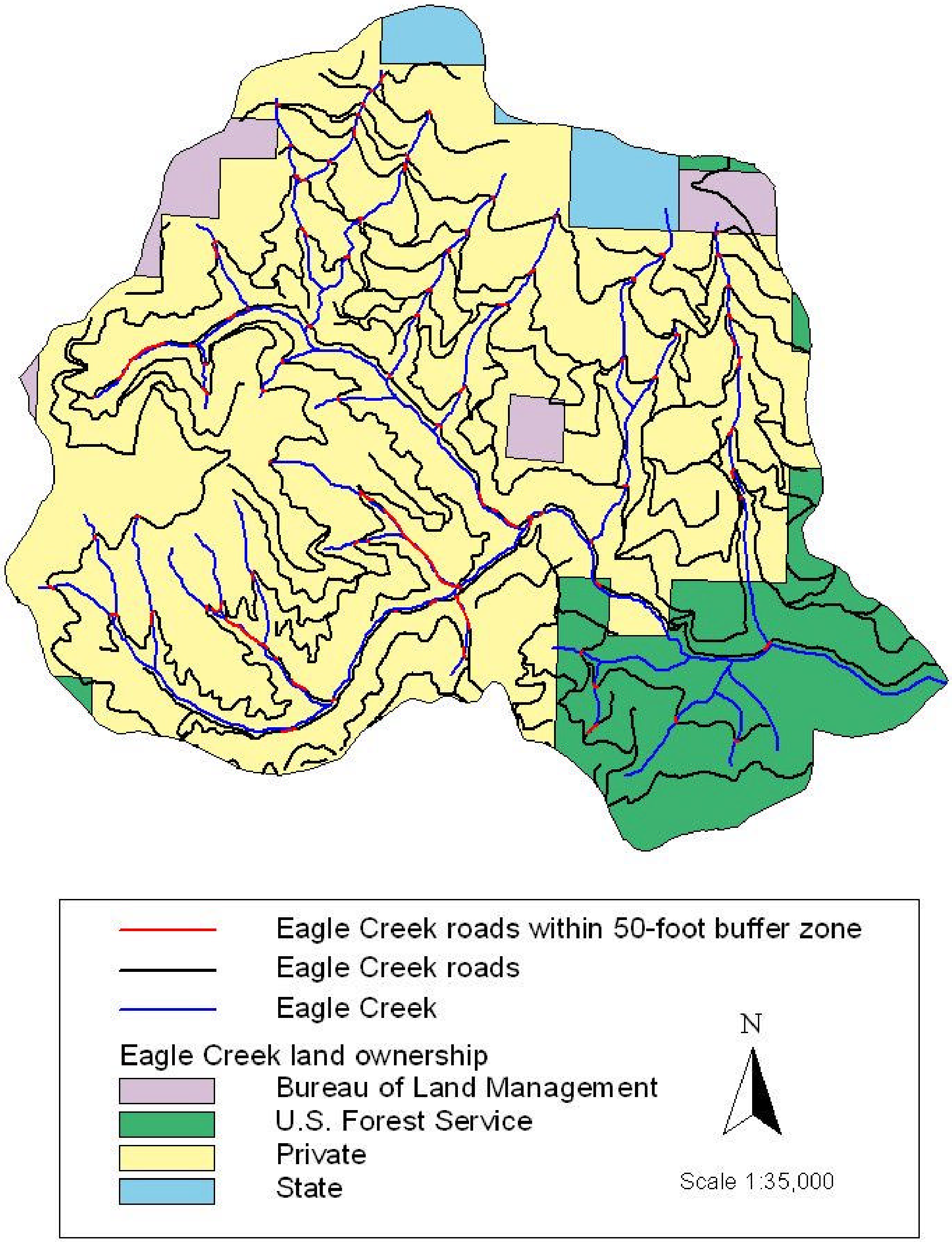

Figure D-3. Eagle Creek Road Mileage

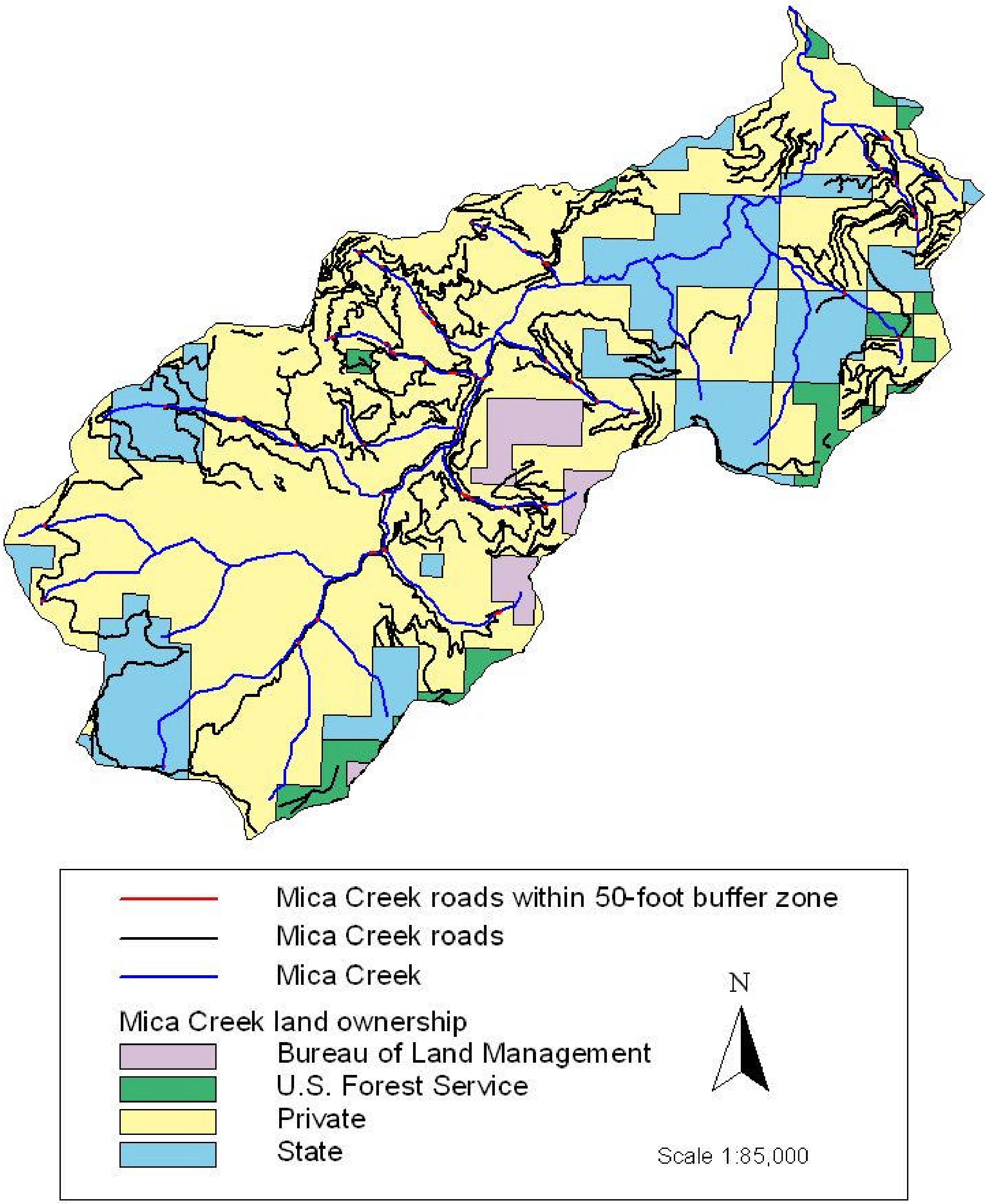

Figure D-4. Mica Creek Road Mileage

Appendix E

Distribution List

Appendix E. Distribution List

Department of Environmental Quality, State Office

Environmental Protection Agency

St. Joe Watershed Advisory Group (WAG) Participants, including:

Name	Affiliation
Mark Addy	Natural Resources Conservation Service
Bob Anderson	Avista Corporation
George Bain	United States Forest Service
Dee Bailey	Coeur d'Alene Tribe
Fred Bear	Idaho Department of Parks and Recreation
Tony Bennett	Idaho Soils Conservation Commission
Lew Brown	Bureau of Land Management
Jack Buell	Benewah County Commissioner
Marti Calabretta	Idaho State Senator
Jon Cantamessa	Shoshone County Commissioner
Jerry Collins	Idaho Conservatoin League
John Ferris	Small Timber Grower
Scott Fields	Coeur d'Alene Tribe
Bob Flagor	Benewah Soil and Water Conservation District/Shoshone Soil and Water Conservation District
Bart Gingerich	Klaveano Ranch
Dolly Hartman	St. Joe Valley Association
Ray Hennekey	Idaho Department of Fish and Game
Dave Johnson	Benewah County Commissioner
Dean Johnson	Idaho Department of Lands
Jim Kingery	University of Idaho
Norm Linton	Potlatch Corporation
Mark Liter	Idaho Department of Fish and Game
Russell Lowry	Citizen
John Macy	United States Forest Service
Bud McCall	Benewah County Commissioner
Jeff McCreary	Ducks Unlimited
Mike Mihelich	Kootenai Environmental Alliance
Alfred Nomee	Coeur d'Alene Tribe
Steve Osburn	Emerald Creek Garnet
Tasha Ozark	Benewah Soil and Water Conservation District
Dell Rust	Idaho Farm Bureau
Fred Schoenick	Benewah Cattlemen's Association
Kelly Scott	Benewah Soil and Water Conservation District
Phoebe Shelden	Benewah Soil and Water Conservation District
Neil Smith	Potlatch Corporation
John Straw	Crown Pacific Inland
Greg Tourtlotte	Idaho Department of Fish and Game
Larry Wright	Potlatch Corporation

Appendix F

Public Comments

Appendix F. Public Comments

Table F-1 summarizes the public comments received regarding the *St. Joe River Subbasin Assessment and TMDLs*, and DEQ's response to these comments.

Table F-1. Public comments and responses to the St. Joe River subbasin assessment.

Source and Comments	DEQ's Response to Comments
United States Forest Service (USFS)	
USFS 1: Roads coverage used are not up to date.	DEQ and IDL update the roads coverage before start of the Subbasin Assessment. However, in the time frame of the Subbasin Assessment, development of roads coverage may change. In order to accurately calculate load reductions, the same road coverage that was used at the start of the Subbasin Assessment will be used during the implementation phase.
USFS 2: Background stream bank erosion measurements have not been made.	Background stream bank erosion has not been accounted for to date. The Natural Resource Conservation Service is exploring methods for doing this, but to date has found them unsatisfactory. Such background erosion is considered in the basin wide export coefficients.
USFS 3: Temperature standards require revision before 303(d) listings and TMDL development.	The data available in this and other subbasin assessments call the temperature standards into question. This matter was taken up by three states in Region 10 (Idaho, Oregon, and Washington), and EPA. The states and EPA did not alter the standard except to add a natural background consideration to it. Thus the standard remains in place and must be addressed by both 303(d) listing and TMDL preparation. The states, including Idaho, are working with the USFS to identify water quality protection Best Management Practices (BMPs) that include thermal protection. If actions such as INFISH management of a stream are implemented, and the forest plan specifically states that BMPs are in place to meet state water quality standards, and the stream fully meets existing and designated beneficial uses, listing may not be required.
Kootenai Environmental Alliance (KEA)	
KEA 1: The lack of listing of lower Marble Creek as water quality limited and development of sediment TMDL.	Marble Creek and many of its tributaries were deleted in the 1998 303(d) process. However, the 2002 303(d) process identified it as water quality limited. Many stream features described qualitatively in the assessments have been quantified in the BURP database and used in the Subbasin Assessment. Unfortunately, the modeling completed in Marble Creek was not completed with actual CWE values, but with

	CWE values of adjacent watersheds. The Subbasin Assessment recommends that a CWE assessment be completed in Marble Creek and the modeling be repeated with the more relevant data. Development of a TMDL is premature because CWE values will be required. The modeling is a key indicator in this case. The stream condition may owe its origins to the history of "splash dam" log transport. If this is the case a TMDL addressing roads and other practices that are not the problem will be ineffective.
KEA 2: The relationship between CWE analysis of roads and roads in rain-on-snow prone topography is not made in the SBA [subbasin assessment] and specifically in the land use tables.	The CWE analysis analyzes the watershed for several factors, among these the location and condition of roads to include sediment yield from those roads or failures to the stream. The CWE analysis examines the conditions as they exist when the survey is completed. Rain-on-snow events are transient phenomena that have their genesis most often in the elevation range of 3,300 to 4,500 feet. We know of no direct relationship between CWE and rain-on-snow events. Specifically CWE does not identify roads or other features in this guideline elevation range. Although rain-on-snow events may be a trigger for erosion related to roads, the location and condition of the roads and road features as measured by CWE are the primary factors. The watersheds developed under periodic rain-on-snow conditions as a stressor. This has not changed. The placement of roads on the landscape is what has changed.
KEA 3: The comment notes that the SBA (subbasin assessment) should describe the TMDL regulations that require the 30-year time frame as part of the load allocation.	The Subbasin Assessment and TMDLs cite the EPA guidance for TMDL preparation. Among that guidance is the requirement that the estimated time frame for watershed recovery be stated and justified. That time frame is stated in the TMDLs and justified. In this case, two large discharge events with a return time of 10 to 15 years are deemed necessary after sediment reduction actions are implemented to remove the deposited sediment from the system. Two events should require roughly 30 years to occur.
KEA 4: The final assessment should supply data on how much land of the largest three owners/managers is in the rain-on-snow zone.	For the reasons stated above (i.e., rain-on-snow is a trigger not a cause) such information does not appear relevant.
KEA 5: Specific regulations for TMDL monitoring should be stated. The regulations under which SBA and TMDLs are developed and implemented are cited in the SBA and TMDLs. If monitoring is not required by these cited regulations it is so stated by inference.	There are no specific regulations for TMDL monitoring; the inference has been removed.

Idaho Department of Lands (IDL)	
IDL 1: The agencies are set up by the temperature standards to fail. The TMDLs will not be achievable or will not achieve the standard.	The temperature standard now has natural background conditions language as a default if the absolute standard cannot be met. Given this language, the temperature TMDLs very quickly point out that stream canopy coverage is the only factor that can reasonably be managed on the landscape and that on some landscape site or vegetation conditions preclude or restrict shading. Thus the TMDLs are designed to provide full shading over time as the management direction where this is possible and to identify those areas, and the shading possible in those areas, where less than 100% shading is possible. The state believes these TMDLs will provide thermal protection to the level of natural background. It is possible to manage stream canopy for the goals placed in the temperature TMDLs. Even natural loss of canopy shade can be included as natural background. The state believes these TMDLs are practical and achievable over time.
Coeur d'Alene Tribe (Tribe)	
Tribe 1: Multiple editorial comments.	All editorial comments were noted and corrected as necessary.
Tribe 2: This subbasin assessment does not address how it, with the proposed TMDLs, will benefit or affect the proposed revision of the Coeur d'Alene Lake Management Plan.	Any nutrient sediment reduction done in this watershed will have a net positive affect on sediment reduction in Coeur d'Alene Lake.
Tribe 3: Was Fishhook Creek listed for temperature?	Yes, Fishhook Creek was listed for temperature in the EPA's additions to the 1998 Idaho 303(d) list.
Tribe 4: Is it possible to have a warm and heavy snow pack?	This term was irrelevant and deleted.
Tribe 5: May want to explain A and B horizons.	See page 6.
Tribe 6: Why are there no scientific names?	Scientific names have been added to the document.
Tribe 7: Why isn't the main stem of the St. Joe listed for temperature?	The river has not been monitored for temperature to date. Once a monitoring program has been established and completed, a determination regarding the need to list the river will be made.
Tribe 8: How long will it take for the seedlings and saplings to get established before they are effective at holding back sediment? How fast does a forest regenerate in terms of years?	See modified text on pages 47-48.
Tribe 9: In the section entitled *Discharge Characteristics*, define the five year period.	The five year period spans 1996-2000.
Tribe 10: Explain the zero values given in Table 15.	The zeroes indicate a stream with no pools.
Tribe 11: Provide a detailed breakdown of the sediment monitoring cost estimate.	Due to the source of the information, a detailed breakdown is not possible.
Tribe 12: What is the scientific basis for the sediment goal?	See explanation starting on page 52.
Tribe 13a: You state that every year "1% of the	a) Streams that are not monitored will be

Rosgen B channels will be monitored until at least 5% of these channels have been assessed after five years." What will happen if after five years a stream has not been selected to be monitored? Are you going to base your results on the outcomes of the other steams near it or go and sample it? Tribe13b: Why were Rosgen B channel types selected and are these the channel types most conducive with fisheries and macroinvertebrate habitat? Tribe 13c: What are the statistical methods used to choose the 5% target?	assessed using data from nearby streams that have been monitored. b) Rosgen B channels were selected as monitoring sites because they are the channel types most likely to house cold water aquatic life and salmonid populations when the stream is in good condition. c) Statistical methods were not used to choose the 5% target. Target selection was based on the what DEQ expects the reasonable resource availability to be at that time.
Tribe 14: Is Fishhook going to have a separate TMDL?	Yes. See page 52.
Tribe 15: Several table modifications are recommended.	These changes have been made where practical.